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*Charme Studio*

Lillien J. Martin.

LILLIEN J. MARTIN, PH.D., EMERITUS PROFESSOR OF PSYCHOLOGY AT STANFORD UNIVERSITY, HAS LONG BEEN RECOGNIZED FOR HER PIONEERING ACTIVITIES IN PSYCHOLOGY. DR. MARTIN CELEBRATED HER NINETY-FIRST BIRTHDAY JULY 7, 1942. (*See* pp. 262-64.)

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JOURNAL OF CONSULTING PSYCHOLOGY

# THE SELECTION AND CLASSIFICATION PROGRAM FOR AVIATION CADETS (AIRCREW—BOMBARDIERS, PILOTS, AND NAVIGATORS)

BY JOHN C. FLANAGAN

PSYCHOLOGICAL DIVISION, OFFICE OF THE AIR SURGEON, HEADQUARTERS, ARMY AIR FORCES

IN warfare as in all other competitive activities, victory is almost invariably achieved by the group which makes the most effective use of its manpower. More than two thousand years ago Plato wrote in the *Republic*, "No two persons are born exactly alike, but each differs from each in natural endowments, one being suited for one occupation and another for another." The group which enables its individuals to discover the activity for which each is best suited with as little wasted time and effort as possible will thereby secure an important advantage over opposing groups.

The fact that large differences exist between individuals in their capacity to become efficient members of a military aviation force needs no emphasis. In spite of the rigorous physical and educational requirements which have been maintained, a large proportion of those beginning flying training have been failed from each class for "lack of aptitude."

The chart below shows the proportion of eliminations from flying training in the Air Forces over a period of years. This large rate of failure is not nearly as serious in time of peace as in time of war. In wartime, when training planes, instructors, and time are at a premium, the elimination of a large number of individuals from the training program, after much effort has been expended in their training, may be crucial. Unfortunately, however, the problem of selection becomes much more difficult in wartime. In peacetime selection could be based on an intensive analysis of each applicant by a specially trained Flight Surgeon. The large number of applicants in wartime makes such procedures impracticable. Also in peacetime there is a large amount of self-selection. In those times only a relatively small proportion of the young men apply for training in military aviation, and these are in general those who believe that their special aptitudes fit them especially for this work. In time of war, with a much larger group of men to be given military training, other factors play a larger part. Individuals who have little aptitude for this training may be attracted by social prestige, salary, or similar ex-

pected gains. When the number of men being trained is small it is possible to restrict applicants to those who have had a broad educational background by imposing such formal requirements as two years of college. It is also possible to restrict applicants in various other ways such as requiring that they be single and of certain ages. However, such requirements are only very indirectly related to the actual needs for success in military aviation.

Because of these various factors it becomes important in time of war to have dependable and efficient procedures for the selection and classification of men for various types of Aviation Cadet training.

Since the last war men in this country and others have been trying to find a simple, single answer to the problem of selecting individuals with aptitude for military aviation training. However, it is well known that individuals differ not in just one respect but in numerous ways. Persons cannot be categorized simply as brilliant, intelligent people capable of doing anything, or dull, stupid individuals unable to perform any task in a satisfactory manner. Many individuals who are distinctly superior as mechanics are mediocre or worse in academic aptitude; an exceptionally accurate marksman may be a very poor sprinter or halfback; and so forth. In order to select individuals for training

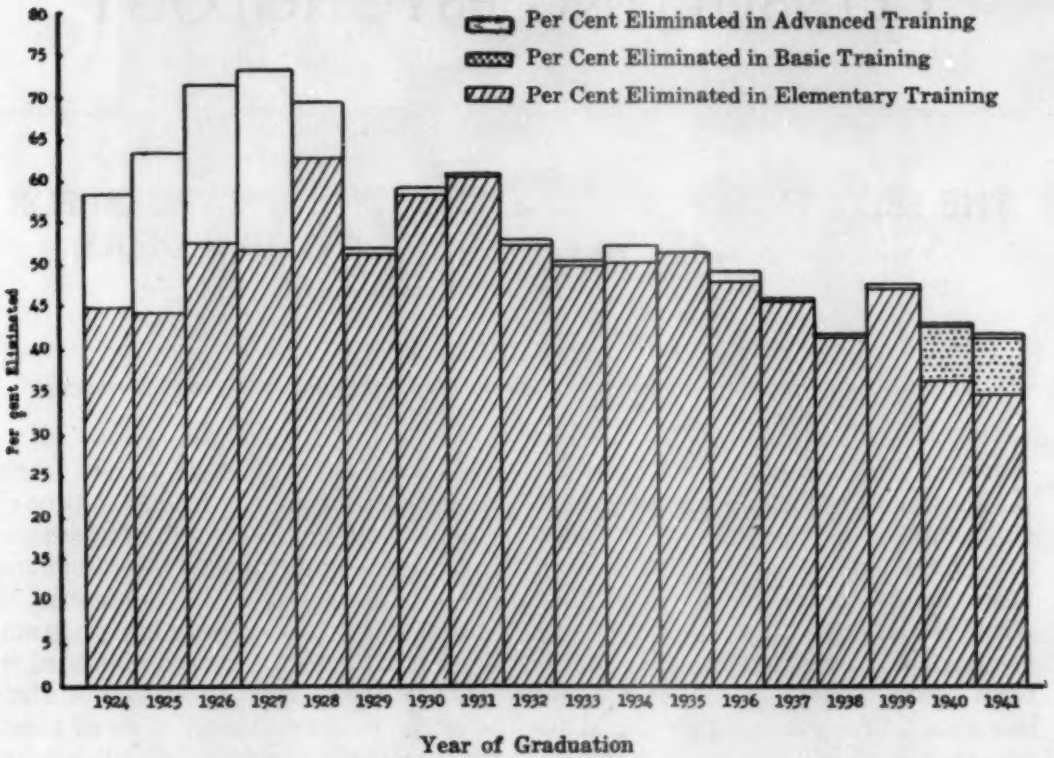


FIG. 1.—The percentage of Aviation Cadets eliminated in the Elementary Basic and Advanced Training Schools during the years from 1924 to 1941. Prior to 1940 no differentiation was made in the statistics between those eliminated in primary and basic training.

as Aviation Cadets, it is necessary to know: the minimum level of general intelligence or academic aptitude which will enable the Cadet to absorb the necessary instruction and training and to perform his duties in a satisfactory manner; the minimum requirements in alertness, speed of decision and reaction, and in the powers of rapid and accurate observation of details; the minimum level of ability to coordinate and to develop skill in controlling the plane through complicated maneuvers smoothly and precisely; and, finally, it is necessary to know the most suitable amounts of aggressiveness, fearlessness, calmness, and similar personality traits. To measure these traits, a well-balanced battery of tests must be applied.

Another problem is to determine the extent to which exceptional qualifications with respect to certain characteristics should be allowed to compensate for deficiencies in other respects. For example, should an unusually alert, skillful and aggressive individual be selected for training even though he falls somewhat below the standards of academic aptitude ordinarily required?

The whole problem of selection resolves itself into whether the *pattern* of aptitudes and characteristics which a particular individual possesses is such that he is likely to make a good officer in the Army Air Forces.

In addition to the general problem of *selecting* Aviation Cadets there is the problem of *classifying* them with respect to the various types of aircrew training —bombardier, pilot, and navigator. While many of the aptitudes and characteristics which produce the good bombardier are also essential to become a good navigator or a good pilot, there are some important differences.

For example, the characteristics which, in the judgment of experts, are essential for the *bombardier* are: excellent eye-hand coordination, superior finger dexterity, and great motor steadiness so that he can accurately manipulate the bomb sight under stress situations. He needs the ability to concentrate on his task, to make rapid mental calculations, and to be calm under distracting conditions. He must be able to learn the theory and operation of a most delicate and exacting piece of apparatus —the bomb sight.

Flying instructors agree that the *pilot* must have the ability to learn complex motor skills involving gross muscular coordination. In addition to this, it is desired that the pilot exhibit superior speed of reaction and the ability to make quick and accurate observations and judgments. While he should be confident and aggressive to be a fighter pilot, he should also be mature and have the ability to command.

It is generally agreed that the cadet who is to be trained as a *navigator* should have superior general ability, so that he may grasp the abstractions of celestial geometry. He needs to be able to understand these mathematical relationships in the abstract and to apply them to practical navigation problems. The navigator should be able to make rapid and accurate mental calculations and be able to maintain his spatial orientation by the use of navigational instruments and maps. However, he need have only enough motor coordination to be able to manipulate such instruments as the sextant and radio compass. In general, the degree of muscular coordination required of the navigator is not as great as that necessary for a bombardier or pilot.

### DEVELOPMENT OF THE PROJECT

To meet the new demands for a practical and objective selection and classifi-

cation program for Aviation Cadets which could be efficiently applied to the thousands of candidates for training in the Army Air Forces, a Psychological Research Project was established early in the summer of 1941 in what is now the Office of the Air Surgeon in the Headquarters of the Army Air Forces. Psychological Research Units were established at each of the three Air Corps Replacement Training Centers (Aircrew) located at Maxwell Field, Alabama; Kelly Field, Texas; and Santa Ana, California. In addition, a special study of bombardiers and navigators was initiated by the Training Division under the immediate supervision of the Personnel Classification Section of the Technical Training Command. The Personnel Procedures Section of The Adjutant General's Office cooperated in this project and also developed a new set of objective educational examinations to be administered to the increasingly large group of applicants who wished to demonstrate that they possessed the "equivalent" of two years of college work. In December 1941 after many thousands of tests had been administered and the results analyzed in connection with these various projects, these activities were merged and the present selection and classification program was formulated.

### THE PRESENT PROCEDURES FOR THE SELECTION OF AVIATION CADETS

Under the new program several hundred Aviation Cadet Examining Boards have been established in the various Corps Areas throughout the country. A person wishing to apply for Aviation Cadet training leading to a commission in the Army Air Forces merely goes to one of these Boards with three letters of recommendation and files his application with the accompanying letters. He is given a general mental examination called the Aviation Cadet Qualifying Examination. This examination measures the types of proficiency in comprehension and in problem solving which are typical of those required in the training schools of the Army Air Forces. He is also given a preliminary physical examination which is similar to that given to applicants for commissions in other branches of the Army. If the applicant passes both of these examinations and if his moral character is considered satisfactory by the Board, he may be enlisted and appointed as an Aviation Cadet.

The use of the Aviation Cadet Qualifying Examination eliminates the previous formal educational requirements and the academic type educational tests designed to demonstrate an "equivalent" amount of educational training. The purpose of the examination is to make it possible for every young man who possesses the required aptitude, knowledge, and skills to have an opportunity to become a bombardier, pilot, or navigator. The examination is designed to qualify all men who have good prospects of succeeding and to eliminate only those who are definitely unqualified for these types of training. This is not a test of the speed with which a series of abstract and artificial questions may be answered; instead it is a test designed to provide a carefully standardized sample of the man's ability to do some of the kinds of things which an Aviation Cadet must be able to do in the training schools. Although most men complete the examination in less than two hours, the applicant may spend as much as three hours on the examination if he wishes. The large number of items and the inclusion of several sections measuring different abilities and characteristics provide a sound and reason-

able basis for the selection of prospective officers in the Air Forces. The kinds of materials included are described briefly below.

An analysis of the duties of Aviation Cadets and officers in the Army Air Forces shows that one of the important qualifications for these individuals is the ability to comprehend instructions and other materials and to follow directions. This ability is chiefly dependent on understanding the precise meaning of words and a proficiency in organizing, relating, interpreting, and drawing conclusions concerning materials read.

In addition to ability to comprehend the material he reads, the Aviation Cadet must possess skill and accuracy in fundamental mathematics and an aptitude for the interpretation of mechanical devices and diagrams. Air Force flying officers must be able to interpret maps, charts, and weather reports. They must know how to plot a course and check the accuracy with which they are following it. These operations must be performed rapidly and accurately. The Aviation Cadet should be able to solve problems involving proportions, fractions, ratios, decimals, formulas, and elementary algebra and also to read and interpret graphs, tables, and charts. In order to obtain a working knowledge of the basic principles of operation of the airplane and the incidental mechanical equipment, aptitude for the comprehension of mechanical diagrams and devices is essential. The questions concerning mathematics and mechanical comprehension are intended to reveal the applicants' aptitudes and potentialities rather than the results of extensive and detailed formal training in these fields.

Finally, as a prospective officer in the Army Air forces, the Aviation Cadet should possess qualities of leadership. The potential leader should be alert to recent changes and developments in aviation and related fields. For effective leadership, demonstrated initiative and inquisitiveness as revealed by an awareness of recent happenings and an understanding of the significance of new developments are of more value than an accumulation of academic credits. Another attribute of the potential leader which is important for Aviation Cadets is sound judgment in practical situations. Poor judgment makes the Cadet a source of danger, not only to himself but to others. To test these characteristics, questions have been prepared requiring a knowledge of recent important events and developments, and also questions presenting practical problems which might be met, not only in flying, but in everyday activities of the type with which applicants could be expected to have had experience.

To give a clearer view of the actual types of questions included in the examination and of the new standards which have been set for the selection of Aviation Cadets, several typical examination questions will be shown. These are actual questions taken from the first form of the examination. It will be noted that the candidate is asked a question, given a problem to solve, asked to read a paragraph or to study a diagram. In all cases he answers the question by choosing the *best* one of the five possible answers which are given for the problem. Other choices may be partially correct but one is definitely the best. A tabulation was made of the answers given for these questions by a typical sample of accepted or passing applicants. A similar tabulation was made for a typical group of those who failed and were rejected. These results in terms of the per cent of each group getting the item correct are shown after each item below.

1. A simulated airdrome is one which is
   1-A hidden.
   1-B exposed.
   1-C *feigned.*
   1-D camouflaged.
   1-E occupied.

Answered correctly by 76 per cent of the passing group and 29 per cent of the failing group.

2. When a balloon rises through a layer of clouds and ascends into the sunshine above, the superheat generated by the sun's rays will cause the balloon to rise, unless its ascent is stopped by valving gas through the appendix. On descending, the descent may be made slowly until the clouds are reached, but as soon as the balloon enters the clouds and the sun becomes obscured, the gas contracts and increases the descending forces. This descending force accumulates until counteracted by the discharging of ballast. If the balloon has descended through a layer of clouds and the earth is immediately below, a considerable amount of ballast must be discharged to compensate for loss of lift due to contraction of the gas. If the pilot waits too long before discharging ballast, the amount thrown is very much larger than if he checks his descent by discharging ballast gradually as the gas contracts.

The most advisable procedure to follow in discharging ballast when descending through clouds is to discharge it
   2-A rapidly when entering the clouds.
   2-B gradually as gas is released from the appendix.
   2-C *slowly as the balloon tends to gain momentum.*
   2-D only during the last part of the descent.
   2-E immediately after the balloon emerges from the clouds.

Answered correctly by 71 per cent of the passing group and 30 per cent of the failing group.

3. As it rounds a sharp curve an automobile goes off the road, turns over completely once (landing on its wheels) and skids onto a smooth ice-covered lake. Under these conditions the car is most likely to
   3-A roll forward without turning over again.
   3-B turn over and over.
   3-C *skid in a relatively straight line.*
   3-D skid in a wide circle.
   3-E roll backward without turning over.

Answered correctly by 78 per cent of the passing group and 50 per cent of the failing group.

4. Bombing attacks are usually made at night chiefly because
   4-A *pursuit planes have great difficulty locating the bombers.*
   4-B radio detection devices do not work well at night.
   4-C fires started by the bombs can be used as targets.
   4-D they prevent the enemy population from obtaining rest.
   4-E they are as effective as daylight attacks but are less dangerous.

Answered correctly by 66 per cent of the passing group and 37 per cent of the failing group.

5. The most common engine-drive fuel pumps used in airplane fuel systems are of the eccentric sliding-vane type of pump shown in Figure 1. When the pump rotor is turned the vanes move the fuel from the inlet to the outlet of the pump. Since the pump is symmetrical about a vertical axis, it will pump in either direction with equal efficiency. Reversing the direction of rotation has the same effect as changing the pump on the mount 180°.

If one of the sliding vanes were to be removed and the slot in the shaft plugged up, rotation of the shaft would then
   5-A move the fuel about the same as before.

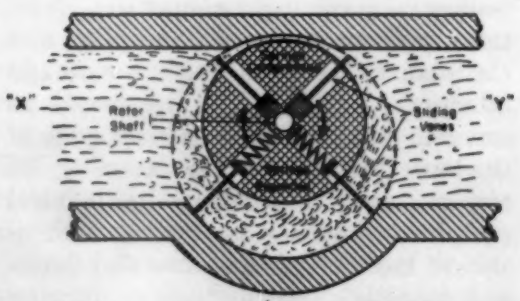


Fig. 1
FUEL PUMP

   5-B pump no fuel at all.
   5-C *force out fuel in an irregular or pulsating stream.*
   5-D pump fuel in a direction the opposite of the former direction.
   5-E pump first in one direction, then in another.

Answered correctly by 92 per cent of the

passing group and 48 per cent of the failing group.

6. The formula $F = \frac{9}{5} C + 32°$ expresses the relation between degrees Fahrenheit and degrees Centigrade. 20° Centigrade equals what Fahrenheit temperature?

6-A 96.6°.
6-B 4°.
6-C 212°.
6-D 36°.
6-E *68°*.

Answered correctly by 90 per cent of the passing group and 36 per cent of the failing group.

It is seen that most of the applicants who pass and are eligible for appointment as Aviation Cadets get these questions right. On the other hand, only a small proportion of the rejected group give the right answer to these questions. The results on these items indicate the general level of ability of the applicants being accepted for Aviation Cadet training and also the level of ability of those being rejected. The complete examination contains 150 questions such as those shown above. It is necessary to answer 90 of them correctly to qualify for training as an Aviation Cadet.

Certain other preliminary data are available concerning the standards on this examination. In a group of several hundred Aviation Cadets tested at Maxwell Field, who had been admitted under the old requirement of two years of college or the "equivalent," it was found that approximately 80 per cent of those classified for pilot training achieved scores of 90 or better; the bombardier group had a very similar distribution of scores; and the navigator group obtained a slightly higher average score. Less than half of a group of enlisted men who were beginning training as pilots obtained scores as high as 90. Slightly more than half of the group of almost a hundred thousand applicants who have taken the test to date have passed. Preliminary analyses have indicated that a large majority of these men have had some college training. A small percentage of the college trained men are failing the test. Almost all of the qualifying group without college training are high school graduates.

Several forms of this test are being developed following a carefully prepared outline and set of specifications. The items are edited by a number of experts in test construction, both in and out of the Service. The preliminary forms are then given to groups of Aviation Cadets at one of the Army Air Forces Classification Centers to obtain statistics concerning the difficulty and discriminating quality of the items. In this way a continual supply of new and improved forms will be made available for the selection of Aviation Cadets.

### CLASSIFICATION FOR A SPECIFIC TYPE OF TRAINING

After a man passes the preliminary physical examination and the Aviation Cadet Qualifying Examination and has been appointed an Aviation Cadet, he is sent to an Air Force Classification Center. Here he is given the more complete physical examination for Aviation Cadets. If he fails this examination, he may be considered for training as an Aviation Cadet for ground crew duty. If he passes, he is given information concerning the training and duties of the bombardier, pilot, and navigator and then asked to rank the various types of training in the order of his preference. In indicating his preference the Cadet is asked to consider his interests, abilities, and previous training in relation to the requirements of the specific types of assignment.

Although the requirements for the various duties have much in common,

there are also significant differences. The Aviation Cadet trained as a *bombardier* studies the theory and practice of bombing. Precision bombing is a complicated procedure requiring rapid reactions and accurate adjustments. When bombing from very high altitudes, even a very small error will cause the bomb to fall far wide of its mark. In very low altitude bombing, the target is in the field of view such a short time that great speed and accuracy of timing are essential.

In precision bombing the dropping of bombs involves the use of the secret bomb sight. This bomb sight, when sighted on the target with the altitude, air speed, and bomb characteristics set into it, automatically performs the computations and adjustments necessary for the accurate release of the bomb. In addition to the usual airplane instruments which must be read to estimate drift, wind, altitude, speed, and so forth, the bombardier has a number of special instruments to use. He has about thirty switches, dials, and levers that he must turn on or set. It is clear that the entire bombing mission will be ineffective unless the bombardier identifies his target accurately and makes the fine adjustments on the bomb sight correctly in spite of distractions. Much training and practice are necessary for the Aviation Cadet to achieve a satisfactory degree of accuracy in hitting the target.

The Aviation Cadet selected for training as a *pilot* is trained first on small training planes. Later he may be given specialized training on fast fighter planes or heavy bomber planes. The fast landing and take-off speeds of some of the new pursuit planes and the large number of instruments and devices on the long-range bombers require that the pilot have good muscular coordination and rapid reactions. The fighter plane is primarily a defensive weapon. It is used to intercept and repulse enemy attacks on military objectives. Another important duty of the fighter pilot is to escort bombing planes.

The offensive weapon of the air forces is the bombing plane. This war has shown that tremendous damage can be done by a properly placed bomb. The bomber pilot has a large amount of responsibility when he takes off in a large bomber worth hundreds of thousands of dollars and heavily loaded with high explosives. Such responsibility requires maturity of judgment if not of age.

The Aviation Cadet classified for training as a *navigator* has much to learn. The science of navigation is an old one, but the requirements of high-speed flying together with modern innovations, such as the various radio aids, have revolutionized many of the procedures. A factor which tends to make aerial navigation more difficult than marine navigation is the greater speed with which the necessary work must be performed in a fast airplane. The basic purpose of navigation is to guide the craft to a given destination following a planned course. This is accomplished chiefly by determining position and direction from time to time and making such adjustments in the planned flight course as appear necessary.

Four general methods are employed in aerial navigation: pilotage, dead reckoning, celestial navigation, and radio navigation. Ordinarily a combination of methods is actually used. *Pilotage* is a very common method of navigation. It is a method familiar to any automobile driver and depends on the observation of landmarks which are recognized either from a map or from previous observation. *Dead reckoning* is the method of finding the position of the plane from a record of the distances es-

timated to have been traveled after each change in direction, beginning with the last known position. *Celestial navigation* is the method based on principles of astronomy. It makes use of observations of the positions of heavenly bodies by means of the sextant. *Radio navigation* includes the use of such devices as the radio beacon, the radio direction finder, and radio bearings. This method has very important advantages especially for flights made at night or when visibility is poor. Its use may be restricted in time of war due to radio interference or necessary radio silence.

It is clear that the navigator occupies a very important position in the aircrew and must be able to make accurate and rapid calculations. He must also have superior intelligence and the type of insight which will enable him to determine very rapidly whether a conclusion is reasonable or not. Although the proportion of planes which do not find their targets because of faulty navigation is a military secret, foreign governments have found it to be so large under combat conditions that the selection and training of navigators has been made one of the major objectives of the aerial bombardment program.

In order to determine which of these three types of duties he is best suited for the Cadet takes a comprehensive battery of aptitude tests at the Air Forces Classification Center. These tests require several hours to complete. Some are given individually and involve performance on various types of mechanical apparatus designed to measure specific functions of the various aircrew members. Others, such as the tests of mathematics, reasoning, map reading, comprehension, dial reading, table reading, and speed of identification, are given to a large group of cadets at one time and the results graded on an electrical test-scoring machine.

Although practically all these tests measure characteristics which are of some importance for any one of the types of training available, some are of more importance for certain types of training than for others. The classification procedure is such that the Aviation Cadet who does well on *all* the tests is given his first preference even though his predicted aptitude is greater for another type of training. Persons with relatively low aptitude scores for all available types of training are assigned on probation. The rest are assigned by the Classification Board according to the data available concerning their aptitudes and preferences.

After they have been classified, Aviation Cadets ordinarily go from the classification centers to the Air Force Preflight Schools in the next class.

### RESEARCH PROCEDURES

Because of the rapid changes taking place in the methods of using military aircraft in combat, this project cannot be thought of as one designed to develop a single, standard set of tests and procedures for the selection and classification of personnel for flying training. It must be regarded as a continuing process of analyzing, developing, checking, and revising. For this reason, procedures are being set up for a continuous research study to check the accuracy of the selection and classification procedures and to insure that the project will keep pace with the changes in training and combat procedures.

Two principal research studies have been made to date. The first of these was an intensive analysis of the Board proceedings of one thousand Aviation Cadets who were eliminated from Elementary Flying Schools in the latter part of 1941. Much effort was spent in

an attempt to obtain a comprehensive set of categories for use in classifying the comments of instructors concerning the Cadets eliminated. These categories were selected to represent not the things actually done by the Cadet, but the characteristics or qualities which were regarded as indicated by this behavior. The categories selected and the percentage of cases in which this particular deficiency was mentioned as a reason for elimination are shown in Table I.

TABLE I

THE PERCENTAGE OF A GROUP OF ONE THOUSAND AVIATION CADETS ELIMINATED FROM ELEMENTARY FLYING SCHOOLS IN THE LATTER PART OF 1941 FOR WHICH DEFICIENCIES IN THESE CATEGORIES WERE LISTED AS A REASON FOR ELIMINATION IN THE REPORT OF THE ACADEMIC BOARD

| Category | Per Cent |
|---|---|
| I. INTELLIGENCE AND JUDGMENT | 68 |
| 1. *Judgment*: Ability to make sound judgments and choices as to the best thing to do when he is faced with a practical problem in traffic, in making forced landings, and in similar situations | 50 |
| 2. *Foresight and planning*: Ability to to plan a series or sequence of maneuvers, plan ahead for landings, plan entry or exit from traffic, and foresee and avoid possible difficulties | 38 |
| 3. *Memory*: Ability to remember instructions from day to day, both general explanations and specific, detailed information | 24 |
| 4. *Comprehension*: Ability to understand and grasp the meaning of explanations, instructions, and demonstrations, either when they are given orally or in written form | 17 |
| II. ALERTNESS AND OBSERVATION | 70 |
| 5. *Visualization of flight course*: Ability to "get out of the cockpit" and fly the plane with reference to the horizon and reference points, as shown by the ability to handle ground pattern work, maintain constant altitude, control the direction of the plane, make turns of the desired amount, etc. | 36 |
| 6. *Estimation of speed and distance*: Ability to make such estimates of speed, distance, and altitude as are required in flying a course, flying in formation, gliding, landing, etc. | 30 |
| 7. *Sense of sustentation*: Ability to sense support or lack of support of the plane, and thus detect slips, skids, or the approach of a stall | 24 |
| 8. *Division of attention*: Ability to remain alert and observant of things around him while flying and at the same time attend to all the necessary details and carry on all the different activities necessary for precision flying | 28 |
| 9. *Orientation*: Ability to find his correct geographic position by the use of any available means, such as familiar reference points which are visible on the ground, identification of the area below as it is represented on charts or maps, etc. | 13 |
| 10. *Speed of decision and reaction*: Ability to think quickly, to make rapid decisions, or to respond with speed and precision when the situation demands | 15 |
| III. COORDINATION AND TECHNIQUE | 81 |
| 11. *Coordination*: Ability to apply the correct pressures to the controls either in combination or in the proper sequence and with proper timing, as evidenced by the way in which he uses together all of the controls necessary in flying the plane | 58 |
| 12. *Appropriateness of controls used*: Knowledge of what control or combination of controls should be used at any particular time while flying and the ability to respond by operating these controls so as to achieve the desired result in relation to the attitude of the plane | 21 |
| 13. *Feel of the controls*: Ability to sense the responsiveness of the plane to control movement, or the effect being produced on the plane by various control pressures by the ability to detect stiffness or "mushiness" of the controls | 2 |
| 14. *Smoothness of control movement*: Ability to operate the controls with smooth, even movements and good touch control, without evidence of roughness, heaviness, or jerkiness | 22 |
| 15. *Progress in developing technique*: Ability to learn rapidly the various coordinations of the controls and tech- | |

niques necessary for flying the plane ..... 54

IV. PERSONALITY AND TEMPERAMENT ..... 43

16. *Absence of tenseness*: Freedom from undue tenseness or rigidness, ability to relax sufficiently while flying ..... 22

17. *Absence of confusion and nervousness*: Ability to remain cool and collected, and to think and act without interference from anxiety or emotion when faced with an emergency or a difficult situation ..... 12

18. *Absence of fear and apprehension*: Presence of a desirable amount of self-confidence, courage, and aggressiveness, with the absence of timidity, cautiousness, or any strong fear of flying ..... 18

19. *Suitable temperament*: Possession of a stable and well-balanced temperament, with absence of careless, erratic and shiftless habits ..... 9

20. *Motivation and attitudes*: Strong interest in aviation and desire to be a military pilot, as shown by his effort, eagerness to learn, willingness to respect flying rules and regulations, and his determination to make good ..... 6

The use of this scale should clarify the instructors' statements as to reasons for eliminations. In the meantime, plans have been made to develop tests of each of these characteristics. The scores on these tests will be compared with the instructors' ratings for the corresponding traits as well as with the records of success or failure in flying training. Similar scales are being developed for use in bombardier and navigator training schools.

In addition to these analyses of the instructors' reports and ratings, a number of other studies are planned to obtain information as to the causes of elimination in the various training schools. These involve interviews with instructors and also with various groups of Aviation Cadets. It is believed that successful Cadets may be able to furnish some clues as to why they are progressing well and Cadets who are failing may provide information as to the chief causes of their difficulties. Continuing analyses of the instructional procedures, especially in terms of the types of Aviation Cadets being selected and classified for a particular type of training, are also planned.

The other principal research study, already accomplished, is the administration of a six-hour battery of tests to several classes of Aviation Cadets at the Maxwell and Kelly Field Replacement Training Centers. The comparison of the results obtained on these tests with the subsequent success in elementary flying training provided important information for the development of the Aviation Cadet Qualifying Examination as well as for the classification program.

To provide a continuing basis for checking the selection and classification procedures, the records are being punched into cards for use with electrical tabulating machines. As these data become available cards will be punched and the necessary tabulations rapidly and efficiently made.

## SUMMARY AND CONCLUSIONS

To build up an efficient Air Force it is necessary to make the most efficient use of the supply of available personnel. Individuals differ in their potentialities for various types of assignments. Procedures have been developed to identify in advance those individuals with superior aptitude for training as Aviation Cadets of various types, and thus to make the training process more efficient and the aircrews graduated more effective.

It is a principal objective of the present program to develop and improve the existing procedures for selection and classification through a continuing study of the accuracy of these methods.

# A COMPARISON OF THE ABBREVIATED AND THE COMPLETE STANFORD-BINET SCALES[1]

By FRED BROWN

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EVERY kindergarten child in the Minneapolis Public Schools is given a complete Binet test (1917 Revision, Form L) by a trained and certified kindergarten teacher-tester. The pupil's chronological age, mental age, I.Q. and centile placement are entered upon his cumulative record card and these data, in conjunction with other information, are then used by the teacher and principal as a basis for planning a program in keeping with the child's scholastic aptitude. Details of the program have already been published (2, 3).

Each examination consumes approximately thirty-five minutes of the teacher's time. School psychologists who would like to introduce a program of this type into their school system might encounter some administrative objection to the length of time which the teacher must spend away from the classroom, especially if kindergarten classes are large. In this study we have attempted to determine whether the abbreviated scale (starred tests), with its attendant saving in time and energy, could be substituted for the longer form of the scale.

The group used in this study consisted of three hundred kindergarten children who were tested by their teachers in the spring of 1941. Cases used in this study were selected at random and represent a normal urban kindergarten population.

[1] The author acknowledges his indebtedness to Isabel I. Berman for valuable suggestions concerning the statistical design of the experiment and to Minerva Lehrman Brown for assistance in rescoring the tests.

## RESULTS

Table I shows the life-age distribution of cases used in this study. The mean C.A. was 5 years 10 months, $\sigma$ 2.2 months. The median was 5 years 9 months, range 5 years 1 month to 6 years 8 months.

TABLE I

DISTRIBUTION OF CHRONOLOGICAL AGES

| C.A. | N | C.A. | N |
|---|---|---|---|
| 6-8 | 1 | 5-11 | 45 |
| 6-7 | 1 | 5-10 | 41 |
| 6-6 | 1 | 5-9 | 46 |
| 6-5 | 1 | 5-8 | 32 |
| 6-4 | 2 | 5-7 | 37 |
| 6-3 | 1 | 5-6 | 25 |
| 6-2 | 8 | 5-5 | 7 |
| 6-1 | 16 | 5-4 | 2 |
| 6-0 | 32 | 5-1 | 2 |

Table II reveals that the distribution of I.Q.'s on the long and short forms of the scale is fairly similar. In Table III we may note that I.Q.'s computed on the short form of the scale tend to be lower than those on the long form. Twenty-four per cent of our cases score higher, 18.6 per cent show no change, and 57.3 per cent score lower on the short form. It should also be noted that 80 per cent of the distribution falls between +4 and −4 I.Q. points. In view of the fact that 16.3

per cent of all cases fall between −5 and −13 points whereas only 3.3 per cent fall between +5 and +10 points it would seem advisable to complete the test by administering unstarred items in those cases where the I.Q. appears to be lower than the examiner's observations would warrant. As an added check upon the trend revealed in this study we analyzed an additional sample of 52 tests administered in the fall of 1941. Of this group 25 per cent showed increases in I.Q., 15.3 per cent remained the same, and 59.6 per cent made lower scores on the short form. Eighty-two and six-tenths per cent of the scores fell between +4 and −4 points.

Table IV shows that the reliability of the short form of the scale at this level is as high or higher than one would demand of an alternate form of the same test. Terman reports a median correlation of .93 for Form L with Form M for ages above six years. It will be noted that the homogeneity of our experimental group is greater than that reported by Terman for his six-year-old sample. Comparable data for the Terman group should therefore be expected to yield a higher reliability coefficient since it is well known that reliability and heterogeneity of a sample are positively related.

TABLE II

COMPARISON OF I.Q. DISTRIBUTIONS ON THE LONG AND SHORT FORMS OF THE STANFORD-BINET SCALE, FORM L

| I.Q. | N (Long) | N (Short) |
|---|---|---|
| 145-149 | 0 | 1 |
| 140-144 | 3 | 2 |
| 135-139 | 3 | 2 |
| 130-134 | 7 | 6 |
| 125-129 | 15 | 14 |
| 120-124 | 18 | 18 |
| 115-119 | 40 | 32 |
| 110-114 | 62 | 50 |
| 105-109 | 45 | 60 |
| 100-104 | 57 | 53 |
| 95-99 | 22 | 28 |
| 90-94 | 16 | 20 |
| 85-89 | 7 | 4 |
| 80-84 | 3 | 8 |
| 75-79 | 2 | 2 |

TABLE III

I.Q. POINTS GAINED AND LOST ON THE SHORT FORM OF THE STANFORD-BINET SCALE, FORM L

| Gain I.Q. Points | N | Per Cent | Loss I.Q. Points | N | Per Cent |
|---|---|---|---|---|---|
| 10 | 1 | .3 | −1 | 40 | 13.3 |
| 9 | 1 | .3 | −2 | 27 | 9.0 |
| 6 | 1 | .3 | −3 | 37 | 12.3 |
| 5 | 7 | 2.3 | −4 | 19 | 6.3 |
| 4 | 6 | 2.0 | −5 | 12 | 4.0 |
| 3 | 26 | 8.7 | −6 | 16 | 5.3 |
| 2 | 19 | 6.3 | −7 | 8 | 2.7 |
| 1 | 11 | 3.7 | −8 | 5 | 1.7 |
| 0 | 56 | 18.7 | −9 | 4 | 1.3 |
| | | | −10 | 3 | 1.0 |
| | | | −13 | 1 | .3 |

TABLE IV

COMPARISON OF I.Q. DATA ON THE LONG AND SHORT FORMS OF THE STANFORD-BINET SCALE, FORM L, YEAR LEVELS IV TO IX, INCLUSIVE ($n = 300$)

| | Range | Median | Mean | $\sigma$ | Mean +Deviation | Mean −Deviation | $M$ | $M_1 - M_2$ | $C.R.$ | $r$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Long Form | 78-143 | 109.7 | 109.1 | 11.4 | | | | | | |
| Short Form | 76-146 | 107.9 | 107.6 | 11.5 | 2.93 | 3.56 | 2.71 | 1.5 | 6.52* | .94 |

* The formula for standard error of the difference when means are correlated was used in this case. The formula is $\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r_{12} \cdot \sigma_{M_1} \cdot \sigma_{M_2}}$.

The mental age range of the long form was 4 years 4 months to 8 years 4 months, with a mean of 6-4 years ($\sigma$ 7.7 months). Mental age range of the short form was 4-2 to 8-6 years, mean 6-3 years ($\sigma$ 6.8 months). The mean positive deviation was 2.11 months; the mean negative deviation 2.43 months; deviation regardless of sign 1.90 months.

Our findings agree closely with those reported by others who have compared the long and short forms of the 1916 revision. Brill (1) obtained $r$'s ranging from .93 to .97. Yoakum and Yerkes (5) reported an $r$ of .92 using only two tests per year level. Irwin and Marks (4) obtained an $r$ of .97.

We are warranted in concluding, therefore, that the abbreviated form of the Revised Stanford-Binet Scale, Form L, (up to and including Year IX) may be used as a valid instrument for the measurement of general intelligence at the kindergarten level.

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# I. Q. CHANGES OF EXCEPTIONAL CHILDREN

By ROY F. STREET

GRAND RAPIDS, MICHIGAN

BEGINNING in the fall of 1931, and periodically thereafter, surveys were made in the public schools of Battle Creek to discover children who might need special care (6). Each child whose discovered needs were such that they could not be supplied in the regular classroom was transferred to a special school where all types of deviations from the normal could be cared for. The term "exceptional" was used to include all types of deviation. Each child so selected was given an individual intelligence test. The Stanford revision of the Binet was used until 1937 when the Terman-Merrill revision was substituted. The Hayes revision was used in cases of severe loss of vision and the Binet test was modified in cases of extreme hearing loss or speech defect. All examinations were conducted by well trained and experienced psychologists.

The children were retested when teachers, nurses or others questioned the initial test results or wanted further information. Of the 1,318 children originally tested, 920 were retested at least once. Of this number, I. Q. changes of 10 points or more were noted in 43 cases. Table I shows the categorical distribution of these changes. Although there were numerous instances of overlap in the total number of cases there did not happen to be any overlap in the 43 cases of special interest. Table II indicates the nature of the change for each case.

Two questions regarding these data have been considered in this paper: why did the changes occur and what significance do they have for the clinician?

Possible causes of variability in intelligence quotients shown between initial and retest results might easily be found in the nature of the measures themselves. The probable error of the mental age for the Stanford-Binet is usually considered to be .5 years. This is approximately correct for the ages represented in this distribution. The 43 cases represent the extremes of the distribution or 2½ to 3 sigmas, which would be approximately ±1.0 year. Allowing for this deduction from the mental age variability many of the changes would be taken care of. In addition errors might be introduced by variability

TABLE I

CHANGES OF TEN POINTS OR MORE IN INTELLIGENCE QUOTIENTS OF FORTY-THREE CHILDREN CLASSIFIED IN VARIOUS TYPES OF DEVIATIONS

| Type | Number Increased | Number Decreased | Total Number Changed | Total Number | Per Cent Changed |
|---|---|---|---|---|---|
| Mentally Superior | 8 | 6 | 14 | 187 | 8 |
| Mentally Deficient | 6 | 0 | 6 | 130 | 5 |
| Reading Deficiency | 3 | 2 | 5 | 189 | 3 |
| Anti-social | 1 | 0 | 1 | 69 | 1 |
| Emotionally Unstable | 1 | 4 | 5 | 104 | 5 |
| Lowered Vitality | 1 | 0 | 1 | 123 | 1 |
| Speech Defect | 0 | 0 | 0 | 185 | 0 |
| Visual Defect | 0 | 0 | 0 | 34 | 0 |
| Hearing Defect | 1 | 0 | 1 | 72 | 1 |
| Cardiac Defect | 0 | 0 | 0 | 37 | 0 |
| Orthopedic Defect | 7 | 3 | 10 | 188 | 5 |
| Total | 28 | 15 | 43 | 1318 | 3 |

TABLE II

FORTY-THREE CASES OF EXCEPTIONAL CHILDREN WITH I. Q. CHANGES OF TEN POINTS OR MORE

| 1st I.Q. | 2nd I.Q. | I.Q. Change | I.Q. Interval | 1st L.A. | 2nd L.A. | 1st M.A. | 2nd M.A. | M.A. Gain | Ant. Gain | Vari-ability | Per cent I.Q. Change |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 98 | 133 | 35 | 2 yrs | 6 | 8 | 5.9 | 10.6 | 4.7 | 2.0 | 2.7 | 36 |
| 114 | 147 | 33 | 2 yrs | 6 | 8 | 6.8 | 11.7 | 4.9 | 3.3 | 1.6 | 29 |
| 140 | 112 | −28 | 6 yrs | 8 | 14 | 11.2 | 15.7 | 4.5 | 8.4 | −3.9 | −20 |
| 126 | 150 | 24 | 2 yrs | 10 | 12 | 12.6 | 18.0 | 5.4 | 2.6 | 2.8 | 19 |
| 124 | 141 | 17 | 5 yrs | 8 | 13 | 9.9 | 18.6 | 8.7 | 6.2 | 2.5 | 14 |
| 125 | 105 | −16 | 5 yrs | 8 | 13 | 10.0 | 13.6 | 3.6 | 6.4 | −2.8 | −13 |
| 128 | 113 | −15 | 3 yrs | 8 | 11 | 10.3 | 12.4 | 2.1 | 3.8 | −1.7 | −12 |
| 126 | 140 | 14 | 2 yrs | 8 | 10 | 10.1 | 14.0 | 3.9 | 2.6 | 1.3 | 11 |
| 132 | 118 | −14 | 4 yrs | 7 | 11 | 9.2 | 13.0 | 3.8 | 5.3 | −2.5 | −11 |
| 114 | 128 | 14 | 2 yrs | 7 | 9 | 8.0 | 11.5 | 3.5 | 2.3 | 1.2 | 12 |
| 139 | 151 | 12 | 5 yrs | 7 | 12 | 9.7 | 18.2 | 8.5 | 7.0 | 1.5 | 9 |
| 129 | 117 | −12 | 5 yrs | 8 | 13 | 10.3 | 15.2 | 4.9 | 6.5 | −1.6 | −10 |
| 127 | 138 | 11 | 3 yrs | 6 | 9 | 7.6 | 12.5 | 4.9 | 3.8 | 1.1 | 9 |
| 150 | 139 | −11 | 2 yrs | 8 | 10 | 12.0 | 13.9 | 1.9 | 3.0 | −1.1 | − 7 |
| 132 | 115 | −17 | 3 yrs | 6 | 9 | 7.9 | 10.4 | 2.5 | 4.0 | −1.5 | −13 |
| 118 | 130 | 12 | 2 yrs | 10 | 12 | 11.8 | 15.6 | 4.8 | 2.4 | 2.4 | 10 |
| 118 | 102 | −16 | 2 yrs | 10 | 12 | 11.8 | 12.2 | .4 | 2.3 | −1.9 | −14 |
| 118 | 86 | −32 | 3 yrs | 8 | 11 | 9.4 | 9.5 | .1 | 3.6 | −3.5 | −28 |
| 107 | 75 | −32 | 4 yrs | 8 | 12 | 8.6 | 9.0 | 1.6 | 4.2 | −2.6 | −30 |
| 104 | 89 | −15 | 7 yrs | 9 | 16 | 9.4 | 14.2 | 4.8 | 7.2 | −1.4 | −14 |
| 103 | 120 | 17 | 2 yrs | 8 | 10 | 8.2 | 12.0 | 3.8 | 2.1 | 1.7 | 16 |
| 54 | 81 | 27 | 2 yrs | 7 | 9 | 3.8 | 7.3 | 3.5 | 1.1 | 2.4 | 50 |
| 60 | 85 | 25 | 2 yrs | 7 | 9 | 4.2 | 7.6 | 3.4 | 1.2 | 2.2 | 42 |
| 43 | 63 | 20 | 2 yrs | 8 | 10 | 3.4 | 6.4 | 3.0 | .9 | 2.1 | 46 |
| 41 | 61 | 20 | 3 yrs | 7 | 10 | 2.7 | 6.1 | 3.4 | 1.4 | 2.0 | 49 |
| 60 | 76 | 16 | 3 yrs | 8 | 11 | 4.8 | 8.4 | 3.6 | 1.8 | 1.8 | 27 |
| 66 | 76 | 10 | 5 yrs | 6 | 11 | 4.0 | 8.4 | 4.4 | 3.3 | 1.1 | 15 |
| 96 | 73 | −23 | 7 yrs | 7 | 14 | 6.7 | 10.2 | 3.5 | 6.7 | −3.2 | −23 |
| 90 | 104 | 14 | 3 yrs | 9 | 12 | 8.1 | 12.6 | 4.5 | 2.7 | 2.2 | 16 |
| 82 | 93 | 11 | 5 yrs | 8 | 13 | 6.5 | 12.1 | 5.6 | 4.1 | 1.5 | 13 |
| 77 | 98 | 21 | 4 yrs | 6 | 10 | 4.6 | 9.8 | 5.2 | 3.1 | 2.1 | 27 |
| 81 | 57 | −24 | 6 yrs | 7 | 13 | 5.6 | 7.4 | 1.8 | 4.9 | −3.1 | −30 |
| 51 | 75 | 24 | 1 yrs | 8 | 9 | 4.1 | 6.8 | 2.7 | .5 | 2.2 | 47 |
| 57 | 89 | 34 | 3 yrs | 6 | 9 | 3.4 | 8.0 | 4.6 | 1.7 | 2.9 | 60 |
| 95 | 127 | 32 | 6 yrs | 6 | 12 | 5.7 | 15.3 | 9.6 | 5.7 | 3.9 | 34 |
| 88 | 63 | −25 | 6 yrs | 8 | 14 | 7.0 | 8.8 | 1.8 | 5.3 | −3.5 | −28 |
| 87 | 109 | 22 | 2 yrs | 6 | 8 | 5.2 | 9.5 | 4.3 | 1.7 | 2.6 | 25 |
| 86 | 108 | 22 | 3 yrs | 9 | 12 | 7.7 | 13.0 | 5.3 | 2.6 | 2.7 | 25 |
| 86 | 102 | 16 | 5 yrs | 6 | 11 | 5.2 | 11.2 | 6.0 | 4.3 | 1.7 | 19 |
| 99 | 115 | 16 | 2 yrs | 6 | 8 | 5.9 | 9.1 | 3.2 | 2.0 | 1.2 | 16 |
| 89 | 105 | 16 | 3 yrs | 7 | 10 | 6.2 | 10.5 | 4.3 | 2.7 | 1.6 | 18 |
| 93 | 78 | −15 | 2 yrs | 9 | 11 | 8.4 | 8.6 | .2 | 1.9 | −1.7 | −16 |
| 82 | 97 | 15 | 3 yrs | 6 | 9 | 4.9 | 8.7 | 3.8 | 2.5 | 1.3 | 18 |

in subject and examiner, by change in the test form, by gross figures, by the accrued experience of the testers, by irregularity of growth and other such variations growing out of the testing situation.

With these considerations in mind, the case histories which contained medi-

cal and dental records, other psychological data, social histories and school progress were examined.

One factor of importance gained from these sources of information seemed to suggest that in many cases the children might not have been capable of completely free expression at the time of the original test. This seemed to be particularly true of the cases represented by the extremes of intelligence. All of the children in the superior brackets whose scores improved were shy, tending to be inarticulate in many of their social relations; all of the defective children showing later gains were negativistic and unresponsive in many of their social relations at the time they were first tested. All of the orthopedic children making later gains had been subjected to severe medical treatment previous to the first examination and tended to be fearful of the clinical situation. Two of the reading cases and the one antisocial case making I. Q. gains might also be classified as children who were shy and verbally inarticulate at the time of the first examination. The one characteristic shown by all of these children making I. Q. gains seemed to be the tendency towards shyness, fearfulness and verbal inarticulation.

An examination of the histories of the children with I. Q. losses revealed that in 7 cases there was a wide variation in the child's general activity and that the teachers and other workers were in wide disagreement about what the child really could do. In none of these cases could either the initial or the retest I.Q. be accepted as a valid measure of the child's real ability. The remaining 8 cases were children in which the interval between initial and retest averaged 5.1 years with an average mental age variability of 3.0 years with numerous intervening tests. In every case the slowed growth evident on the tests was consistent with the other data and the teachers were in agreement that normal growth had not taken place.

Two of these cases had a congenital deformity with possible neurological involvements. The records gave no clues as to the possible causes of the retarded growth in the other 6 cases. With one exception, the home environment and the school situation had been greatly improved, and in all cases physical defects had been corrected and the children were happier and more responsive than when first seen.

Although the above facts seemed to be true about the 43 cases with I. Q. changes, any one of these factors would not have been an adequate criterion for assuming at the time of the initial test that the I. Q. change might have taken place. Many other bright children were shy and verbally inarticulate when first seen and many other defective children were negativistic and hard to test. Most of the orthopedic children had been subjected to severe medical treatment and most of the reading cases tended to avoid any activity reminding them of reading. Emotionally unstable and antisocial children were frequently difficult to test.

The surprising result of this study is that so high a reliability on retest could be obtained with children whose examination was difficult, although Sims (5) found this to be true in his study of I.Q. changes in psychopathic and normal children. Gray and Marsden, (2) on the basis of their study of the constancy of the intelligence quotient, would predict a higher variation for a normal population. Brown (1) found the I. Q. change of behavior problem children to be little greater than for normal children. Kephart (3) reported a much greater change in his study of high-grade deficient boys.

These findings have some interesting implications for the clinical psychologist:

1. They should cause the clinician to have a tolerant but wholesome distrust of all of the studies which attempt to account for I. Q. changes on the basis of one variable, studies which have been quite adequately summarized by Thorndike (7), McNemar (4) and Wellman, Skeels and Skodak (8).

2. The high reliability with deviated children obtained in this study is probably the result of very careful initial testing, when every possible variable which might have affected the results was considered and the tests or test procedure modified to meet the specific problems and variations.

3. It is apparently impossible at the time of an initial test to determine which cases may later show I. Q. changes.

4. Because it is impossible to know which test results are going to show marked variation over a period of time, the clinician becomes very cautious about the use of the I.Q. in diagnosis and prediction.

5. The intelligence test probably serves its best purpose in combination with other information which permits a broader picture of the individual's potentialities.

6. The indiscriminate use of intelligence tests by laymen and teachers is fraught with danger to individual children, and frequently creates a problem for the professional psychologist.

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# AN EXPERIMENTAL ANALYSIS OF ARTHUR PERFORMANCE QUOTIENTS[1, 2]

By SIDNEY W. BIJOU

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IN the course of a series of investigations concerned with psychometric pattern analysis, it became apparent that an experimental evaluation of performance ratings was imperative. Although this, too, is a pattern study, it has been designed so that emphasis is placed on the meaning of Grace Arthur Performance scores (1). At the outset it should be mentioned that the term psychometric pattern refers to a statement, verbal or numerical, of the relationship between two, or more, reliable test scores.

Practically all clinical psychologists employ performance scales, yet there is little agreement as to when such tests should be administered and as to how these test results should be interpreted. Some believe, explicitly or implicitly, that a verbal intelligence test such as the Stanford-Binet is an all-sufficient test of intelligence and therefore adhere to the practice of substituting a performance test for the Binet only in cases having special language or sensory handicaps. Others believe that performance tests should be given to all subjects, not as a substitute, nor even as a supplement to the Stanford-Binet, but as an additional instrument which enhances their observations. Porteus (9), a proponent of this point of view, states: "The writer has always strongly held to the opinion that performance tests should be applied to all children and, whenever there is a question of mental diagnosis, should be admitted to equal status with the verbal or language test." Westburgh (10) is more emphatic: "Naïve acceptance of single test results, even in the limited sense in which they may legitimately be regarded as an aid in clinical study, has done much to discredit the use of tests . . . The clinical psychologist, if he is to feel sure of his grounds in rendering a diagnosis, dares not rely on the result from a single test, or even on results from two."

Actually, most clinical psychologists would be eager to accept the broader point of view if it could be demonstrated that by taking performance ratings into account, they could improve their interpretations. There is, however, a paucity of objective material on the meaning of performance test scores. In the first place, performance scales are seldom validated on relationships to other independent measures, as they should be whenever possible (5). Great emphasis has been placed, as it certainly should be, on methods of establishing item validity. However, there has been a general acceptance of indirect measures of scale validity, that is, correlations between the newly devised scale

[1] From the Wayne County Training School, Northville, Michigan, Robert H. Haskell, M.D., Medical Superintendent, Department of Research, Thorleif G. Hegge, Ph.D., Director of Research and Education.

[2] Presented at the Twenty-Seventh Annual Meeting of the Michigan Academy of Science, Arts, and Letters, Ann Arbor, Michigan, 1942.

and a well-known test. As Porteus (9) and many others have pointed out, this is a highly dubious procedure. In the second place, experimental and critical studies of established performance tests have, for some unknown reason, been limited mainly to the technical aspects of the scales.[3] In view of these considerations, it is obvious that clinical psychologists who prefer to use performance tests routinely are forced to interpret the findings in the light of restricted clinical observations and current opinion.

The present investigation is designed to help us gain some understanding as to the meaning of performance ratings. Specifically, it aims to study the relationship between high and low Arthur Performance Quotients (P.Q.'s) on the one hand, and academic achievements, shop ratings, and personal-social adjustment, on the other.

From the mentally retarded children in residence at the Wayne County Training School, 70 boys between nine and fifteen years of age, were selected because of wide disparities between Revised Stanford-Binet I.Q.'s and Grace Arthur P.Q.'s. A disparity was considered "wide" if it deviated at least one sigma, plus or minus, from the mean P.Q.-I.Q. difference for all boys in residence. Thirty-five subjects having high P.Q.'s were carefully matched, according to Binet mental age, with 35 having low P.Q.'s. In terms of mean test ages and Q.'s the groups compared as follows:

| Group | M.A. | I.Q | P.Q. | Difference |
|---|---|---|---|---|
| High Performance | 9-8 | 71 | 98 | +27 |
| Low Performance | 9-7.5 | 74 | 66 | − 8 |

[3] For excellent examples of this type of treatment *see* the reviews and references bearing on the Grace Arthur Scale in the *1940 Mental Measurements Yearbook* (4).

It should be pointed out that the mean I.Q.'s were derived from individual scores ranging from 47 to 92, and that the mean P.Q.-I.Q. differences of +27 and −8 deviated from the mean population difference +1.45 sigma and −1.32 sigma respectively. The estimated difference in performance age is 4 years 6 months in favor of the high group. In other words, the experiment was designed to establish two groups of mentally retarded young boys equated on Binet mental ages, but varying sharply on Arthur Performance ratings.

To ascertain academic achievement, each child was given the Jastak-Bijou Wide-Range Achievement Test of word reading, written spelling, and arithmetic computation (7). This is an individual clinical scale with norms ranging from kindergarten through college. To evaluate nonacademic proficiency, semester grade-ratings in wood work, printing, sheet metal work, machine work, and handicraft were taken from the permanent school records and averaged. And finally, to estimate personal-social adjustment, the names of each matched pair were submitted to four judges instructed to indicate the better adjusted boy. The judges, three psychologists and a general supervisor, rendered decisions only on boys well-known to them. Frequency of selection determined the final adjustment rating.

For each group, reading, spelling, and arithmetic grade scores were averaged. Individual ratios of arithmetic to reading scores were calculated and averaged for the groups. A ratio above 100 indicates that arithmetic achievement is higher than reading achievement; a ratio below 100 signifies a reverse relationship. Similarly, shop ratings were averaged, and the percentage of better adjusted boys in each group was determined. Tests of significance, based up-

on small sample theory, were used for differences where applicable.

## RESULTS AND DISCUSSION

The results, given in numerical summary in Table I, may be stated as follows:

TABLE I

MEANS AND DIFFERENCES FOR THE HIGH AND LOW PERFORMANCE GROUPS CONSISTING OF 35 CASES WHOSE BINET I.Q.'S RANGE FROM 47 TO 92

| | High Performance Group | Low Performance Group | Difference | Per Cent for Fisher's $t$ |
|---|---|---|---|---|
| Reading Grade | 2.6 | 3.05 | −.45 | 16 |
| Spelling Grade | 2.4 | 2.6 | −.2 | 33 |
| Arithmetic Grade | 3.6 | 3.4 | +.2 | 25 |
| Arithmetic/Reading ($A/R \times 100$) | 138 | 130* | +8 | 41 |
| Shop Rating | 32† | 29 | +3 | 8 |
| Per Cent Better Adjusted | 74 | 17 | + | |

* Derived from a bimodal distribution.
† A rating of 30 signifies average proficiency; a rating of 50 is maximum; 10 minimum.

(1) According to Fisher's $t$-tests (8) none of the differences in academic and nonacademic attainment is statistically reliable at the one per cent level of confidence.

(2) The high-performance boys are comparatively homogeneous in their relative scholastic achievements. Their arithmetic grade-scores are approximately equal to, or greater than their reading scores. None of the $A/R$ ratios was below 91. On the other hand, the low-performance boys are extremely heterogeneous in relative school achievement. According to Snedecor's table, $F$ is significant below the one per cent level. These boys' arithmetic scores are extremely high or extremely low relative to reading; the $A/R$ ratios extend from 64 to 240 with a definite gap in the middle range.

(3) As to personal-social adjustment, 74 per cent of the boys judged to be better adjusted than their matched partners belonged to the high performance group; 17 per cent to the low performance group. Three pairs, or 9 per cent, of the total group were judged to be about equal in general adjustment.

It will be recalled that the mean Binet I.Q.'s for the two groups were 71 and 74 and that individual scores ranged from 47 to 92. Let us consider how the results are modified when boys with Binet I.Q.'s below 65 are eliminated. In other words, we now wish to examine the meaning of performance scores of boys who have a minimum Binet intelligence rating of 65. This line of demarcation was arbitrarily selected as the level at which an appreciable degree of school achievement may be expected.

The results for these two groups of boys, shown in Table II, may be summarized as follows:

TABLE II

MEANS AND DIFFERENCES FOR THE HIGH AND LOW PERFORMANCE GROUPS CONSISTING OF 22 CASES WHOSE BINET I.Q.'S RANGE FROM 65 TO 92

| | High Performance Group | Low Performance Group | Difference | Per Cent for Fisher's $t$ |
|---|---|---|---|---|
| Reading Grade | 3.0 | 3.9 | −.9 | Below 1 |
| Spelling Grade | 2.7 | 3.0 | −.3 | 25 |
| Arithmetic Grade | 4.0 | 4.1 | −.1 | 70 |
| Arithmetic/Reading ($A/R \times 100$) | 133 | 116* | +17 | 15 |
| Shop Rating | 36 | 29 | +7 | Below 1 |
| Per Cent Better Adjusted | 77 | 14 | + | |

* Derived from bimodal distribution.

(1) The high- and low-performance boys at the relatively higher Binet I.Q.

levels have approximately equal attainment in spelling and arithmetic. However, the low-performance boys are more proficient in reading, despite equal Binet mental ages. This difference is statistically significant below the one per cent level.

(2) It follows that the high-performance boys do relatively better in arithmetic than in reading or spelling. Their mean *A/R* ratio of 133 is calculated from a set of consistently high scores as shown by a sigma of 34.38. In contradistinction to this, the mean *A/R* ratio of 116 for the low-performance boys is derived from two discrete subgroups, indicating that approximately half the group does excellently in arithmetic, the other half very poorly. The mean for the subgroup with high ratios is 148, while the mean for the low ratio group is only 78.

(3) The high-performance boys earn a better than average proficiency rating in shop work and are superior, as a group, to the low-performance boys. Again the difference is statistically significant below the one per cent level.

(4) Finally, 77 per cent of the boys deemed better adjusted than their matched mates came from the high-performance group; 14 per cent from the low group. Two pairs, or 9 per cent were judged to be approximately equally well adjusted. This finding, it will be noted, is consistent with the previous results.

Because of the small number of cases having Binet I.Q.'s below 65, little can be said concerning the meaning of the Arthur P.Q.'s on boys with low general intelligence, that is, boys with Binet I.Q.'s between 47 and 64. However, the differences between the 13 matched pairs of boys in this category were computed and tested in order to obtain some indication of the probable trends. None of the mean differences, except one, differs significantly from zero. All the high-performance boys had higher arithmetic grade-scores than their matched mates, the mean difference being +.69 grade, which is significant at the one per cent level. Two other findings are noteworthy. First, 24 of the 26 boys composing the two groups have *A/R* ratios above 97, denoting that practically all these boys do relatively better in reading regardless of the direction of P.Q.-I.Q. disparity. Hence there is no evidence of a dichotomy in the low-performance distribution of *A/R* ratios. Second, in close correspondence to previous findings, 69 per cent of the boys judged to be better adjusted belonged to the high-performance group and 23 per cent to the low-performance group. The boys of one pair were considered equally well adjusted.

Let us now integrate these findings for the formulation of a tentative statement on the significance of Arthur P.Q.'s as applied to mentally retarded children.

In the first place, mentally retarded boys possessing extremely high P.Q.'s are rated higher in personal-social adjustment than boys with extremely low P.Q.'s. As a review of the literature on pattern analysis (2) has shown, similar findings have been reported on a variety of subjects. A synthesis of these results has led to such concepts as behavior, efficiency, mental control, mental disorganization, and so forth, which have been related to the behavior structure.

Second, boys with high P.Q.'s consistently have high arithmetic ratings relative to reading, that is, high *A/R* ratios. On the other hand, boys with low P.Q.'s are variable in this respect: they may have very high or very low *A/R* ratios. Thus, most of the 70 boys in this study can be divided into three dis-

tinct types of psychometric patterns; namely, high performance plus high *A/R* ratio; low performance plus high *A/R* ratio; and low performance plus low *A/R* ratio.[4] The finding that there are three rather than two groups of boys tends to reinforce and extend the formulation of a relationship between types of psychometric patterns and personal-social adjustment (3). Throughout this study most of the boys with high performance-high *A/R* ratios have been judged to be better adjusted than their matched mates. Those designated as equal or inferior were found to be matched with low-performance boys having high *A/R* ratios. This finding suggests that further investigations may reveal that the low performance-high *A/R* ratio boys form some kind of an intermediate or mixed group. Finally, most of the low performance-low *A/R* ratio boys have not only been judged to be poorer in general adjustment, but their case records reveal that as a group they are among the problem children of the Training School. Similar findings have been reported on children brought to mental hygiene clinics (6).

Third, P.Q.-I.Q. differences are related to reading and arithmetic achievement. However, the absolute Binet I.Q. level must be taken into account. For example, high-performance boys with low Binet I.Q.'s (below 65) attain reading scores commensurate with their mental ability, whereas high-performance boys with higher Binet I.Q.'s (65-92) are retarded by the same standard. Furthermore, it appears that for low I.Q. boys, prognosis for school achievement is better when the P.Q. is significantly higher than the I.Q.

Fourth, proficiency in nonacademic subjects is directly related to performance rating provided the Binet I.Q.'s are above the middle moron category. At the lower intelligence classification levels, this relationship does not seem to hold. Thus under prescribed conditions there seems to be positive relationships among high performance, high arithmetic, shop work proficiency, and personal-social adjustment. It appears that mentally retarded boys with such a constellation of scores and ratings have common factors in their behavior structure.

These findings are extremely provocative, particularly to those interested in the challenging problems of clinical psychology. It is evident that if this line of investigation[5] is pursued we shall have not only a reservoir of interpretive material for such tests as the Grace Arthur, but also an accumulation of valuable data to guide us in improving our clinical instruments and techniques. Furthermore, such investigations on pattern analysis will undoubtedly stimulate new concepts, hypotheses and theories sorely needed for rendering more satisfactory psychological service.

[4] The significance of these patterns, in terms of correlates not considered here, is being studied at the present time. There is some promise that they are related to the various combinations of conditions which bring boys to the Training School.

[5] Future studies in this area should take advantage of the efficient experimental designs suggested by Lindquist (8). The methods of analysis of variance and co-variance should be particularly fitting.

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# A NOTE CONCERNING A NEW COURSE IN MILITARY PSYCHOLOGY[1]

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IN order to aid in the general war effort the Department of Psychology at the University of Illinois is combining the practical applications of several special fields within psychology into a course suitable for university men enrolled in officers' training units. This seemed a desirable step inasmuch as training in human engineering, military in its orientation, may well facilitate, through reduction in the amount of trial and error, the acquisition of useful methods in the handling and training of soldiers by potential officers. The initiation of this program, in addition, appears feasible by virtue of the existence of a well-developed unit of a broader nature in certain other countries. The role of the psychologist in this and related fields of military operation has also been emphasized by Bingham (1), Louttit (2), Yerkes (3), and others. The purpose of this note is to describe briefly the nature of this curricular offering.

The subject matter of the course entitled Military Psychology is entirely applied in its orientation. It consists of seven major divisions each of which is pertinent to the facilitation of handling and training soldiers by young men about to become commissioned officers. A description of each of these divisions follows. The first two weeks of the semester is given to a consideration of how to lead and how to discipline men. During this period of instruction the role of learning and habit formation is stressed. During the second two weeks problems of soldier morale and its engendering are emphasized. This division is followed by a study of the ways in which to use incentives, rewards, and punishments. The fourth section of the course considers observational proficiencies and limitations in relation to specific military situations. The fifth topic entails a consideration of efficiency and the roles of fatigue and various drugs in human proficiency. The sixth unit deals with the resolution of practical problems contingent upon the selection and placement of soldiers by their commanding officers. Three weeks are devoted to this topic. The final division is concerned with the question of personality adjustment in army life as pertaining to the function of the young officer. The psychotechnology of leadership, discipline, morale, selection and placement of men is given considerable emphasis as shown in these brief statements. Throughout the course the orientation is applied and *not* theoretical. Throughout the aim is to aid the young officer in his handling and training of the men in his command.

Technical arrangements include the following. The student receives two hours of credit toward graduation. Only

[1] In the University of Illinois *Catalogue* and *Time Table* (1942-1943) this will be designated as Psychology 50, Military Psychology.

junior and senior men enrolled in Advanced Military Science and Tactics are eligible for entrance to the course. In the absence of suitable texts, both military and psychological reference works are reserved in a centrally located library for use by the students. Each of the seven divisions is prepared and presented by a member of the staff[2] whose training and research equips him to deal with this problem in a strictly applied manner. An evaluation of these arrangements is in progress.

In summary, the Department of Psychology at the University of Illinois is offering this semester a two-hour course entitled Military Psychology. In so doing the express aim is to present an applied and a very practical discussion of selected military problem-situations which entail the utilization of techniques essentially psychological in nature. Only college men about to receive their commissions as officers in our armed forces are eligible to elect the course. Should additional information be requested the members of the Co-ordinating Committee[3] will endeavor to supply the additional facts.

[2] Those instructing in the course are: H. B. Carlson, H. W. Case, J. T. Cowles, W. M. Gilbert, L. M. Hanks, W. G. McAllister, L. A. Pennington, and P. T. Young.

[3] The writers compose this committee which was appointed by Professor Herbert Woodrow, Head of the Department.

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# THE ADOLESCENT GROWTH STUDY[1]

## VI. THE ANALYSIS OF VOICE RECORDS

By HAROLD E. JONES

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FOR psychologists the study of speech has usually focussed upon the study of words, of explicit symbolic functions rather than of the non-intellectual aspects of vocal expression. It is of course obvious that in an interpretation of words we respond to factors of inflection, pitch, melody, rhythm, and other perhaps more subtle characteristics of speech. These characteristics guide us not merely in understanding what a person is saying about a topic of discourse, but also as to what he is saying about himself. We have, however, not ordinarily regarded this as a field for scientific inquiry, since our impressions of a speaker's personality, based on such indications, are usually submerged in relatively inaccessible hunches or prejudices. Before a more rational and systematic analysis can be made, it is necessary to have specific organizing principles; these have been suggested in the course of clinical experience, and in the accompanying article by Dr. Paul J. Moses are listed in somewhat tentative and preliminary form. They are preliminary because the psychological significance of many vocal characteristics cannot as yet be set forth as fully known, but only as hypothesized. The indications which he points out must at the present time be regarded not as clear signposts to personality diagnosis, but chiefly as suggestions for further clinical study of the individual, and also as suggestions for research.

In the past one of the difficulties in such research has consisted in the fact that interpretations of the voice have been made by clinicians who were at the same time aware of other aspects of the individual's expressive behavior, and hence it has been difficult to exclude the influence of the other characteristics. As one of the procedures in the Adolescent Growth Study, voice records have been taken for each subject in a standardized situation, using acetate disks and a magnetic type of cutting head operating in a "high fidelity" recording unit; the cutter, moving laterally, was precisely controlled by an overhead lathe. The records obtained in this way have been submitted for analyses by judges who do not know the individuals, and have no information about them other than what is presented by the phonograph record.

With the completion of the series, one form of treatment of this material will consist in a correlation of specific personality ratings based on the vocal records with ratings or scores derived from

[1] Previous reports in this series, all published in the JOURNAL, have included: I. Principles and Methods (by H. E. Jones), 1939, 3: 157-159; II. Procedures (by H. E. Jones), 1939, 3: 177-180; III Skeletal X-Rays as Indicators of Maturity (by Nancy Bayley), 1940, 4: 69-73; IV. The Development of Vocational Attitudes (by H. D. Carter), 1940, 4: 185-191; V. Observational Methods in the Study of Individual Development (by H. E. Jones), 1940, 4: 234-238.

observational and other sources. Another, more clinical type of evaluation has been made. This is briefly illustrated in the following summary (by the writer) of (*a*) Dr. Moses' "blind" interpretations of a voice record (i.e., with no other information about the subject) and (*b*) Dr. Zygmunt Piotrowski's "blind" interpretations of two Rorschach records for the same subject, a boy in the senior year of high school. The case was not specially selected with reference to these records, but was the first in which the comparison has been completed. The voice record included responses to a free association test, and the recital of a story in response to one of the pictures (Boy with a Violin) in the Morgan-Murray Thematic Apperception Test. The analysis of the record involved the categories listed in the accompanying article; the intellectual content of the record was of course also a factor which could not readily be excluded in the analysis.

*Case A-3*

Social Relationships

Voice Record: Effeminate. He thinks about himself and makes himself the center of his world, playing a self conscious social role, in expectation of a response from his audience. Histrionic, sometimes pompous. Ambitious in an unsocial way. While appearing to withdraw, he is not solitary but needs people if only to use them as objects for sadistic expression ("to show them up, tease and torment them.")

Rorschach: Effeminate. Adapts to environment less by self-control than by cautious cleverness and affectation. Direct emotional relations to environment are less well organized than his "inner life."

Emotional Reactivity

Voice Record: Fearfulness, cowardice, and sensitivity can be recognized as dominant factors. Lacking in wholehearted enthusiasm.

Rorschach: Great tension exists in this case, from conflicts between opposing tendencies. He is irritable, and has great difficulty in making an effortless and satisfactory adjustment.

Direction of Emotional Adjustments

Voice Record: Self-consciousness and rigidity can be noted, but there is also some evidence of a sadistic component, with infantile destructiveness.

Rorschach: Inhibitory tendencies are in conflict with a tendency to "let go." He hesitates between an active outgoing attitude and one of submission and resignation.

Intellectual Functions

Voice Record: Intelligent and gifted, but not precise in his work. He is autistic in his thinking, with a "dance macabre" of fantastic ideas.

Rorschach: Superior intelligence. He shows creative imagination and has a productive inner life. His performance, however, is uneven because of the influence of emotional tensions. Underlying conflicts affect his fundamental attitude toward the world and toward his own future.

It can be seen in this illustrative case that the two sets of interpretations (from voice records, and from the Rorschach test) are not incompatible with each other, and in fact reveal a number of pertinent points of agreement, in spite of the marked difference in the type of materials utilized. It is the writer's view, however, that a particular expressive or projective technique will be of varying usefulness for different subjects, and that no one approach is likely to be fully adequate for any one subject. Only when we have used a discriminating combination of methods, seen in the light of data from the individual's life history, can we feel at all secure with regard to errors of omission or commission in interpretations derived from a single technique.

# THE STUDY OF PERSONALITY FROM RECORDS OF THE VOICE

By PAUL J. MOSES, M.D.
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IN the analysis of voice records, attention is given to some twenty features of the voice which, in the writer's clinical experience, have proved to have suggestive value in the interpretation of personal characteristics. These variables are systematically examined and summarized for each case, although of course they may not all be significant for a given case.

1. *Level of form.*—This is the "general impression" we receive of the speaker's voice. referring particularly to indications of educational or cultural background.

2. *Symmetry.*—The identical and repeated placement of phonetic units in articulation. Perfect symmetry tends to suggest well-balanced coordination as well as habits of carefulness.

3. *Range.*—The total range consists of the head register, the mixed register and the chest register. The normal speaking voice is located in the lower third of our total range. It is about *a - d* in men, *A - D* in women. The conversational voice of normal individuals is a mixture of chest and head register, the so-called mixed voice. We know these items better from the analysis of the singing voice, where we call pure head register the falsetto voice and where we know the pure chest register from Russian bassos. Switching from one pure register to the other is called "yodling." The range of the speaking voice includes pure head register. In moments of excitement the pure head register appears; the chest register marks the true "ring of conviction."

4. *Basic pitch.*—The basic pitch can be found by determining the pitch of the last syllable in a declarative sentence. We talk "around the pitch." It can often be used as a clue to age as well as sex of the speaker; melodic analysis shows that the basic pitch has a characteristic relation to the pitches of the preceding syllables.

5. *Keys.*—Speech melody obeys the same harmonic laws as music. If we determine the pitch of each single syllable, we find these different pitches involve either a major or minor scale. Therefore we can state that: "This speech has been made in F minor (e.g. King George of England) or A minor (Edward of Windsor). In the writer's clinical experience, the predominance of "major" or "minor" in the voice suggests predominantly optimistic or pessimistic attitudes.

6. *Prevalent register.*—In the "blind" analysis of a voice record the prevalent register is a possible clue to constitutional make-up. "Linear" individuals, variously characterized as "asthenic" or "ectomorphic," tend to reveal a predominant head register in their voice mixtures; in a singing voice we would call it lyrical. The so-called "pyknic" or "endomorphic" individual tends

to have a "dramatic" character in his singing voice, due to a prevalent chest component. If in general we compare chest function with earth and head function with water, the mixture of both used as speaking voice would be clay. The asthenic would talk with a thinner, more watery clay, whereas the pyknic voice would be comparable to thicker clay. The asthenic is also sometimes marked by a tendency to "jump" from a head to a chest function.

7. *Stress, emphasis.* — Whereas *Stress*, underlining a word, gives dynamic and musical accent to one syllable, *Emphasis* may involve a whole thought. It is expressed in connection with a prevailing chest resonance. Reading aloud often involves an unconscious emphasis resulting in a raise of voice for almost a minor third. This has to be taken into consideration in analyzing the voice of a radio speaker who reads from a manuscript; his spontaneous voice would be lower.

8. *Pathos.*—In obtaining a voice record for analysis, it is desirable to provide a situation which will stimulate some degree of emotional arousal. Pathos, in the sense in which it is used here, denotes not affection but geunine emotion. In "pathetic speech" vocal details are revealed as though under a magnifying class; pathetic speech is more solemn, more important. The larger movement requires more time, therefore the accents are more marked and have more of a slow motion character. If the melody of single syllables becomes especially distinct, speaking is closer to singing; if the rhythmical components stand out, we feel these utterances closer to poetry.

Individual records may show an exaggeration of either head or chest resonance. Voices produced with a natural chest resonance are often regarded as "honest," "warm," "sympathetic," etc. On the other hand, in voices which are produced naturally with predominant head register, the emphasizing of a chest register sometimes appears as an indication of artificiality or insincerity.

9. *Speed.*—Among individuals sometimes described as "volitional," great speed in speaking may indicate fervid activity. Slowness in speaking, among such individuals, suggests concentration and calm, but may also reveal irresolution. In individuals more predominantly "emotional," speed carries a suggestion of vivacity or excitement, while slowness may accompany a merely dull mood. Excessive speed in speaking has so many different causes that it can never be analyzed without implicating other factors. Where increased speed occurs without a marked rhythm, the suggestion is of superficiality.

10. *Pausing between words.*—A distinction can be made between speed of articulation and pausing between words; when an individual pronounces words rapidly but with marked intervening pauses, the effect is to emphasize rhythm and to neglect melody. Such a pattern of speaking may often accompany a rational, volitional, unemotional trend of response. A tendency to pause between words is likewise difficult to interpret without other information, for it may imply either circumspection or lack of concentration, extremely careful thought or emotional blockage, etc.

11. *Melody.*—Speech melody is the expression of the musical contents of a word or sentence. We recognize a declarative sentence and question by the falling or raising melody. Melody has been called the "mimics" of speech. Even if we do not understand the language, from its melodious qualities alone we are able to find out whether it is a question, a declarative sentence, a command

or a request. The grammatical structure of a sentence requests a certain melody. The emotional condition of the speaker adds another factor to the formation of the melody. A greater "sensibility" of the speaker may appear as an increased melody. Individuals described as "logical" may be expected to stress the dynamic rather than the melodious qualities of speech. This can be shown in vocal records which involve the reading of a passage. Individuals marked by other criteria as "subjective-sensuous" tend to read rather slowly and with an emphasis of melody, while more "intellective" individuals tend to read the same passage with faster time and a flatter melodious curve.

We differentiate between a swinging and a jumping melody, and here certain parallels have been hypothesized between voice and personality. The swinging melody, passing the pitches, has been characterized as a decidedly cycloid symptom (parallel to the "swinging" temperament of this type). The jumping melody at one bound passes from one pitch to the other, and has been regarded by some as expressing the "jumping" character of the schizoid. The epileptic tends to have a very small rigid melody, expressive of the rigidity which occurs in the epileptic character.

12. *Uniformity, monotony.*—Uniformity, often an expression of mental depression, means the repetition of a declining melody. Sentences and clauses start at the same pitch and drop in pitch, to end at the same low pitch. This melody covers a small range. Monotony, on the other hand, sticks to one pitch and has no melody; it is frequently noted in the voices of hysterics, and while not suggesting mental depression, it carries a definitely pathological implication.

13. *Respiration.*—The factor of respiration in speaking deserves consideration with reference to:

(*a*) Intensity, since the sound volume depends on the amount of air that causes the vocal cords to vibrate.

(*b*) "Inspiratory speech," which involves speaking during inspiration instead of expiration; this is sometimes an indication of lack of control and may be associated with emotional excitement. Inspiratory speech can readily be recorded by means of pneumography, giving exact registration of the proportion between breathing activity and voice.

(*c*) "Wild air," which involves the use of more air than can be employed in producing vibrations in the vocal cords. Physiologically it is based upon the inability to proportionate diaphragmatic and laryngeal coordination, and may occur in some extreme emotional conditions.

(*d*) Pleasure and displeasure. In pleasure the inspiration tends to be short, while the expiration tends to be long. In displeasure we frequently note the reverse relationship.

14. *Pitch of final syllables.* The declarative sentence has its lowest pitch on the last syllable. In an interrogatory sentence the location of the highest pitch varies according to the number of syllables and also according to variations in emphasis. If in declarative sentences the pitch of the last syllable is not lower than the pitch of the preceding one, it may express diplomacy, irresolution or "want of principles." Exact pitch at the end of the declarative sentence may serve as a clue to stability, power of resistance, constancy, severity or insensibility. Pitch of final syllables usually indicates the basic pitch. However, we find many characteristic variations. In fact, speakers often do not lower their pitch, but make a gliding transition in melody between sentences and clauses; this appears to be characteristic of talk-

ative individuals.

15. *Quality.*—The quality of a voice, including for example timbre, is related to physiological factors and conveys clues as to general health, as well as to condition of the vocal organs.

16. *Exactness.*—Enunciation which appears to us to be careless may have different interpretations according to the emotional factors which are involved. Thus, it may be merely a series of mispronunciations based on ignorance or a lack of interest in maintaining conventional standards, or on the other hand it may indicate the break-through of urges or impulses which disturb normal articulations. The term "doughy" is applied to speech which lacks sharpness and precision; it sometimes provides a clue to a lack of self-discipline, to rudeness, or sensuality.

17. *Melism.*—The individual touch that we give to our speech melody, anticipating and stimulating the reaction of the addressed person, is called melism. The use of melisms is a typical symptom of a social relation, or an urge for communication. The more melisms we find, the more this urge becomes apparent. Therefore the schizoid individual, who wants to be left alone, has certainly less melism than a cycloid, who may be frequently in search for company.

In any act of speech, we must to some extent anticipate the structure to follow, for otherwise we could not start on a pitch that would remain in logical and musical proportion to the next syllables. Individual differences in this melodic and rhythmic pattern of speech, and the adaptation of the pattern to social relationships, may provide important clues in the study of personality.

18. *Loudness.*—The degree of loudness to be analyzed in its proportion to the desired effect. It frequently provides an indication of emotional factors, of the individual's momentary emotional adjustment, and also of what may be termed emotional congruence or emotional "honesty."

19. *Rhythmic prevalence*—Rhythm means the regular repetition of the same occurrences, including physiological variations. The wings of a seagull swing as rhythmically as our vocal cords vibrate. Both reveal the irregularities of facts in the living substance. Machines work in time but not in rhythm. Lively motion is always expressed rhythmically, whereas rigid inanimateness, pedantry and narrowness create timed changes rather than rhythm. In the analysis of speech records, attention is given to characteristic rhythms, their degree of freedom or modulation, and to the occurrence of opposed extremes which may be called hypo-rhythms and hyper-rhythm.

20. *Nasal resonance.*—Sex urge, libido, impulse for close human contact tends to evoke an increased swelling of mucous membranes in the nose. This results in a change of voice that is in a striking contrast to the expression of hatred or the urge to be left alone; in the latter case, the diminished volume of the nasal mucous membranes influences the voice through creating greater intranasal space.

These qualities become typical for different emotional utterances in anger or shock. The mucous membranes of the nose may become anemic, shrink and produce a more or less persistent enlargement of the nasal space. Deep feeling and sexual irritation cause the mucous membranes to swell, the result of which is increased nasal sound. Sex urge leads to a stressing of vowles and neglect of consonants to the point of almost mispronouncing them.

21. *Individualities.*—Under this top-

ic we try to summarize individual habits, peculiarities, outstanding characteristics, which quite often impress us more than all the clues mentioned above. From many persons, especially actors, we remember these individualities. Their evaluation usually overlaps with the preceding items.

Many years of clinical study have taught us that the analysis of recorded voices enables us to draw more thorough conclusions than direct analysis. The presence of the speaker gives us the opportunity to register, with adequate laboratory equipment, the most delicate details of pronunciation, jaw movements, larynx movements, the proportions of thoracic and abdominal respiration, etc. In our method of analyzing phonograph records we must sacrifice these pneumographic and kymographic aids. The records, however, enable us to repeat speech details as often as may be required, and also permit us to obtain independent assessments from different listeners, including those who are unfamiliar with the subjects and who (for experimental purposes) can evaluate the records without being influenced by other indications.

# LILLIEN JANE MARTIN: CONSULTANT UNRETIRED

IN the spring of 1916 the Stanford Department of Psychology, then under the chairmanship of Dr. Frank Angell, arranged in the customary manner for the retirement, and the subsequent *emeritus* designation of one of its professors who had reached the age of sixty-five years. Dr. Lillien Jane Martin was the staff member recognized on this occasion. Dr. Martin modestly acknowledged the honors accorded her, bade her academic friends a pleasant good-day, boarded a train for San Francisco, and established herself as a consulting psychologist.

Twenty-six years have passed since the occurrences just set forth, and Dr. Martin, at the age of ninety-one, is still practicing as a consulting psychologist. Not only has she made a successful adjustment to a new and pioneering professional career, thus setting a worthy example to retiring professors everywhere, but she has used her talents to help hundreds of her fellow beings rise above the traditional discouragements of advancing age and develop interesting and useful life activities. She perceived, in the light of special circumstances, the importance of this field of human endeavor, and became one of its first professional adherents. It seems fitting in these pages to thus recognize a remarkable career in consulting psychology.

A native of New York state, Dr. Martin was graduated from Vassar College in 1880. After teaching science in Indianapolis High School for nine years she became vice-principal and head of the science department of Girls High School, in San Francisco. In 1899 she was called to Stanford, where she served seventeen years. During this period she made numerous trips abroad, pursuing her studies at Göttingen, Würtzburg, Bonn, and Munich. As a teacher of psychology she made many lasting friends among her students, one of whom is now privileged to prepare this sketch.

Dr. Martin's earlier writings, which include publications in both English and German, were concerned chiefly with problems of aesthetics, imagery, and memory. One of these, "Psychology of Aesthetics. I. Experimental Prospecting in the Field of the Comic (1905)," is a laboratory study of humorous drawings, including the identification of the component elements in perception and appreciation of comic situations.[1] This was followed shortly by "An Experimental Study of Fechner's Principles of Aesthetics (1906),"[2] and "Über äesthetische Synasthesie," which appeared in *Zeitschrift für Psychologie* in 1909.[3] Several contributions were made to the *Proceedings of the American Psychological Association*, beginning with the issue of 1910, and including, in 1911, an experimental critique, "Memory Versus Imagination."[4]

In 1912, in consequence of a gift from Thomas Welton Stanford, brother of Leland Stanford, the university bearing this family name established a labora-

[1] *American Journal of Psychology*, 1905, 16: 35-118.
[2] *Psychological Review*, 1906, 13: 142-88.
[3] *Op. cit.*, 1909, 53: 1-60.
[4] Abstract in *Psychological Bulletin*, 1912, 9: 61-2.

tory for psychical research, under the direction of John Edgar Coover. As a member of the staff in psychology, Dr. Martin collaborated with Dr. Coover in some of his painstaking experiments. The comprehensive report of the laboratory, published in 1917, contains a section of contributions by Dr. Martin, including "A Case of Pseudo-Prophesy," in which there was set at rest a rumored gift of prophesy on the part of a Stanford student who, three years before the earthquake of 1906, had drawn a poster depicting the ruins of the famous arch which served as a campus landmark; a study of "Ghosts and the Projection of Visual Images"; and "An Experimental Study of the Subconscious," dealing with automatic writing.[5] These investigations, in keeping with those of Dr. Coover, established natural and reasonable explanations for various phenomena popularly attributed to the action of supernatural forces.

While teaching at Stanford, Dr. Martin became interested in mental hygiene, and organized one of the first university courses to be so designated. In connection with her private practice in San Francisco she established several mental hygiene clinics, and encouraged the use of psychological methods in the hospital treatment of children. Her views on this subject were set forth in an article appearing in the initial volume of the *Journal of Applied Psychology*, entitled "Mental Hygiene and the Importance of Investigating It (1917)."[6] Her volume, *Mental Hygiene: Two Years' Experience of a Clinical Psychologist*, was published in 1920.[7] This interest was further expressed by active participation in organizing the California Society for Mental Hygiene, and serving as its president from 1917 to 1921.

After extensive travel and the publication of a volume entitled *Round the World with a Psychologist* (1927) professional practice was resumed by Dr. Martin.[8] Having been consulted by numerous elderly folk, Dr. Martin turned her attention to this new application of psychology. In 1929 she founded the Old Age Counseling Center in San Francisco, and became its director. Two books, written jointly with Clare de-Gruchy, *Salvaging Old Age* (1930),[9] and *Sweeping the Cobwebs* (1933),[10] are based largely upon clinical studies and observations of persons to whom advancing age had become a problem.

The procedure followed in undertaking individual studies is revealed in *Sweeping the Cobwebs* (p. 6):

> The life history is never taken by means of a formal questionnaire, nor is any sort of test blank used. To check against any number of the most carefully chosen questions would fail of our purpose in giving us what we really want to know. But in this unhampered narrative lie a thousand hints and suggestions that throw light on his general and specific attitude toward life, all of which must be discussed later with him if we are to help him assemble his forces and direct them toward their fullest experience.

And again (p. 11):

> What we work for is to induce the person to become an intelligent self-starter in the right direction by showing him himself in an objective light. . . . For true or false, his native or acquired view of himself is what will eventually determine his activity as an individual or as a group member.

Practical methods of cobweb-sweeping, which also reveal significant points in Dr. Martin's philosophy of life, are embodied in such suggestions as the following (p. 41):

[5] *Experiments in Physical Research at Leland Stanford Junior University.* Stanford University, Cal.: The University, 1917. Pp. 641.
[6] *Op. cit.*, pp. 67-70.
[7] Baltimore: Warwick & York. Pp. 89.
[8] San Francisco, Stacey. Pp. 122.
[9] New York: The Macmillan Co. Pp. 175.
[10] New York: The Macmillan Co. Pp. 183.

> The goal or purpose of the individual is the most serious point in his life, since it is the plank on which he stands. The motivation to action that it exerts is so powerful a driving force that there is nothing else which can be substituted for it. The result of a worthy goal, daily striven for, is the most salutary influence in personal life and in the life of the community.

Among Dr. Martin's more recent writings, also prepared with the collaboration of Clare deGruchy, is a book which was published in 1938, *The Home in a Democracy*.[11] This volume, dedicated to a group of parents and teachers who had sought psychological advice, presents Dr. Martin's conception of practical child psychology and the responsibility of the home in bringing about normal adjustments. It contains numerous simply-phrased comments, designed to help ordinary people avoid some of the common errors to which they are subject. On the subject of reinforcing the school, she says (p. 17):

> It is a mistake to think the school alone can give the child the thinking power we wish him to have. The traditional school of the past prized in its pupils the well-stocked memory and fluent expression. . . . He crammed his mind with odd bits of information. . . . . It was impossible for him to retain such knowledge for it was never really his. What we make our own must be experienced, lived through and retained because of its proved usefulness.

During her long career as teacher and consultant Dr. Martin has retained a kindly attitude toward those with whom she has been called upon to deal. Her understanding has been keen, because of her ability to see life in the light of its deeper meanings and practical relationships. Her contribution to consulting psychology has been that of the pioneer who ventures boldly into the unknown with the confidence that newly-blazed trails will eventually become the highways leading to wider human opportunities.

J. HAROLD WILLIAMS
LOS ANGELES
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[11] San Francisco: Harr Wagner Publishing Co. Pp. 200.

# News Notes

Dr. Steuart Henderson Britt has been appointed Executive Director of the Office of Psychological Personnel, located in the building of the National Research Council, 2101 Constitution Avenue, Washington, D. C. This office has been created by the American Psychological Association in order to assist psychologists throughout the country on various personnel problems, such as information concerning the utilization of psychologists in the federal government, the Army, the Navy, and in various research projects. It is not a governmental agency, but exists in order to serve as a "clearing house of information" for psychologists, and to perform other duties in Washington, D. C., for psychologists (regardless of professional affiliation) living in other sections of the country.

Dr. Edwina A. Cowan is directing a vocational survey of employment needs in Kansas based on monthly summaries of the movement of employees obtained from personnel directors in leading companies.

*Personal Problems of Everyday Life*,[1] by Lee Edward Travis and Dorothy W. Baruch, has received Honorable Mention as a distinctive contribution to the field of child development and parental interest, according to an announcement by *Parents' Magazine* of its Sixteenth Annual Award for outstanding books for parents.

[1]New York: D. Appleton Century Co., 1941. Pp. 421.

The Psychological Corporation announces the James McKeen Cattell grants-in-aid of research in applied psychology. These grants are primarily available to students who have completed all or practically all course work for their doctoral degree in some field of applied psychology, and whose research projects have already received faculty approval. The amount of each grant is $250. Announcement of the awards will be made September 1, 1942.

A Conference on Human Development in War Time was held on the campus of Ohio State University June 29-July 3. The topics discussed were the implications of psychology, sociology, education, medicine and nutrition for wartime needs. Daniel C. Prescott, Willard C. Olson, Sidney L. Pressey, Carl R. Rogers and Winona Morgan were among the discussants participating in the conference.

An Institute on Professional Training of Psychologists was held at Pennsylvania State College, June 22-26. The purpose of the meeting was to discuss the professional preparation of psychologists. Participants in the program were: Robert G. Bernreuter, Marion A. Bills, Edgar A. Doll, Florentine Hackbusch, Frank H. Koos, Donald B. Lindsley, B. V. Moore, T. Ernest Newland, Carl R. Rogers, Percival M. Symonds, M. R. Trabue, Lloyd H. Zeigler.

An introductory course in scientific Graphology will be conducted by Mrs.

Thea Stein Lewinson at the New York State Psychiatric Institute and Hospital, 722 West 168th Street, New York City beginning Wednesday evening, October 7th, 1942, at 8:30. This course will consist of ten weekly sessions on Wednesday evening from 8:30 to 10 o'clock. The course is limited to those who are professionally interested in the scientific development of handwriting analysis and is open only to professionally trained clinicians or research workers. The fee for the course will be $15.00. After the completion of this course, arrangements will be made for a special seminar for those interested in more intensive graphological training. Applications should be made to Mrs. Thea Stein Lewinson, New York State Psychiatric, 722 West 168th Street, New York City.

At an organization meeting held in Los Angeles on February 28, 1942, the California Association of Applied Psychologists was formed. Two branches, one for Southern California and one for Northern California, will hold bimonthly meetings and the entire association will meet twice a year. The officers for 1942 are: President, Herman deFremery, Ph.D., Alto Psychologic Center, San Francisco; Vice President, Guy W. Wadsworth, A.B., Southern California Gas Company; Secretary-Treasurer, Sybil K. Richardson, A.M., Los Angeles County Schools.

The Illinois Society of Consulting Psychologists has obtained through the efforts of Andrew W. Brown approval for a Division of Psychologists to serve on a voluntary basis as members of the Illinois Selective Service System. This Society has also prepared a report of a survey on psychological service in Illinois. Plans are under way for some form of active participation in the state conference of the Illinois Welfare Association during the week of November 9, at Rock Island. The possibility of affiliting with the Illinois Welfare Association is being considered by the Illinois Society.

Members of the Kansas Association of Consulting Psychologists are reported to be assisting in the present emergency in the following ways: aiding the local draft boards in screening out untrainable draftees, contributing to the educational efforts of the American Red Cross, instructing parents in methods of dealing with children during air raids and blackouts, serving in an advisory capacity to committees dealing with moral and public education, assisting in making surveys of public opinion.

Newly elected officers of the Metropolitan New York Association for Applied Psychology are: President, Minna C. Wilkins, Ph.D.; Vice President, Brian E. Tomlinson, Ph.D.; Members-at-Large of the Executive Council, Clairette P. Armstrong, Ph.D., Myrtle B. McGraw, Ph.D.

A Directory of Resources for Psychologists in New York City, consisting of ten mimeographed pages of community resources most frequently needed by clinical psychologists, has been prepared by the Committee on Relations with Other Professions. Dr. Rina C. Nidenour, of the New York City Committee on Mental Hygiene, was the Chairman of the committee which prepared the directory.

The Seventh Annual Meeting of the Midwestern Psychological Association was held under the auspices of the Department of Psychology of Washington University, at Hotel Statler, St. Louis,

May 1-2. The formal sessions included fifty-four papers on: comparative psychology, psychological tests, human learning, social psychology, abnormal psychology, conditioning, personality, and physiological psychology. These were symposium discussions of learning, conditioning theory, problems of graduate students, education and psychology, motivation, industrial and vocational psychology, psychology and morale, and psychology and the war. There were 228 persons registered, this number representing a decline of about one-third previous registrations at other cities similarly located. Newly elected officers are: President, Robert H. Seashore, Northwestern University; Secretary-Treasurer, Dael Wolfle, University of Chicago; Members-at-Large of the Executive Council, Chester W. Darrow and Dean A. Worcester.

Following a series of preliminary meetings an organization meeting of the National Council of Women Psychologists was held in New York City, December, 1941, at which time temporary officers were elected, a Committee on Constitution and By-Laws appointed. These organization efforts culminated in an election by mail ballot of the following permanent officers: President, Florence L. Goodenough, Ph.D., Vice President, Helen Peak, Ph.D., Treasurer, Theodora M. Abel, Ph.D., Executive Secretary, Gladys C. Schwesinger, Ph.D. Members of the Board of Directors are: Marion A. Bills, Ph.D., Alice I. Bryan, Ph.D., Edwina A. Cowan, Ph. D., Florence Mateer, Ph.D., Myrtle McGraw, Ph.D., Harriet O'Shea, Ph.D., Ruth Tolman, Ph.D., Dorothy Van Alstyn, Ph.D.

Women psychologists in the New York area have formed the first local chapter of the National Council of Women Psychologists, with Clairette P. Armstrong, Ph.D., president, and Cecile White Fleming, Ph.D., secretary.

Problems pertaining to a legal definition of "psychologist" and methods of certifying qualified clinical psychologists were discussed at the annual business meeting of the Ohio Association for Applied Psychology, held on the campus of Ohio State University, June 20. Recommendations were submitted to the Ohio Children's Code Commission which is now engaged in the task of recodifying all the laws of the state of Ohio pertaining to the welfare of children. There was also a discussion of the use of psychologists in the United States Employment Service.

Last year the Ohio Association for Applied Psychology affiliated with the Ohio Welfare Conference as a kindred group. The Ohio Association has prepared a program for this conference which is to be held in Columbus, on October 6-9, 1942. The general topics selected for this program are, Diagnosis and Prediction of Child Adjustment, and the Psychologist's Contribution to Programs of Care and Treatment for Children.

Officers of the Association elected for the year 1942-43 are as follows: President, Wilda M. Rosebrook, Ph. D., Consultant, Bureau of Special and Adult Education, Ohio State University; Secretary-Treasurer, Frank P. Bates, Ph.D., Psychologist, State Bureau of Juvenile Research, Columbus.

Psychometric Techniques with Young Deaf Children was the subject of an illustrated discussion by Dr. Marshall S. Hiskey at the annual meeting of the Pennsylvania Association of Clinical Psychologists held in Harrisburgh, on April 27. The program also included a panel discussion on The Rorschach

Technique, under the leadership of Dr. Robert Bernreuter, with Dr. Bruno Klopfer, Miss Florentine Hackbusch, and Dr. E. Louise Hamilton participating. In his Presidential Address Dr. Robert Brotemarkle talked about psychological work in the Service.

Officers elected for the year 1942-43 are: President, Marion Monroe, Ph.D., Board of Education, Pittsburgh; Vice President, M. S. Viteles, Ph. D., University of Pennsylvania; Secretary, Mary I. Elwood, Ph.D., Board of Education, Pittsburgh; Treasurer, Mary Vanuxem, Ph. D., Laurelton State Village. Ten Associates were accepted for membership.

Newly elected officers of the Southern Society for Philosophy and Psychology are: President, Dr. Christian Paul Heinlein, of Florida State College for Women; Secretary-Treasurer, Dr. Wayne Dennis, of Louisiana State University; Members of the Council, Dr. Elizabeth Duffy, Dr. S. Rains Wallace, and Dr. Peter A. Carmichael.

The Twenty-Second Annual Meeting of the Western Psychological Association, the first wartime meeting was held at the University of Washington, Seattle, June 26-27, 1942. A total of only thirty-two persons registered, which is probably the smallest attendance at any Association meeting. The meetings were unhurried, and a good deal of discussion and questioning was carried out. Sixteen papers were read, including an excellent symposium on "Some Psychological Factors Involved in the Establishment of Permanent Peace."

At the annual banquet held Friday evening, the society was addressed by the retiring Vice President, Howard C. Gilhousen, on "Motivation and Morale." E. R. Hilgard, who had been elected president, resigned during the year to take a post in Washington, D. C.

Officers elected for the coming year were: President, Jean Macfarlane, Institute of Child Welfare, University of California; Vice President, William Griffith, Reed College; Secretary-Treasurer for a three-year term, Lester F. Beck, University of Oregon.

The Association is scheduled to meet next year in the Bay area probably around June 18 and 19.

# BOOK REVIEW

**PRINCIPLES AND TECHNIQUES OF GUIDANCE. By D. Welty Lefever, Archie M. Turrell, and Henry I. Weitzel. New York: The Ronald Press Co., 1941. Pp. 522. $3.00.**

If one is looking for a comprehensive text on guidance at the secondary school level, this book will be found excellent—especially so in the senior high-school and junior college areas. It covers the philosophy of guidance, the administration of guidance programs and the techniques of guidance—all in a generous manner. It is most suitable for serious guidance courses on the graduate level and for in-service training for teachers and administrators who have, or hope to have, anything to do with a guidance program.

Certain disturbing questions regarding the place of education in guidance are recognized and discussed frankly in this volume. Not only are means of clearing them up suggested, but the whole book seems to be written with these solutions in mind.

One of these questions relates to the personnel to carry on guidance practices in the school. Many educators believe that there need be few, if any, special guidance workers, that teachers should be versed in guidance practices and that these practices should be an intimate part of the instructional process. The authors of this book would, no doubt, concede that there would be little need for special guidance workers in a school where the curriculum is based on large areas of activities and the teachers understand the pupil-personnel approach. They point out, however, and very eloquently, it seems to this reviewer, that the actual situation is that schools are operating on a subject basis, that it will be a long time before the curriculum is changed to a pupil activity curriculum, and that most schools do not have teachers who are able to do the guidance job properly. Following this line of reasoning, the authors have produced a practical book which fits the needs of the present situation in the schools. The place of teachers in the guidance picture is by no means neglected, however. Their work is clearly outlined—even for the subject-dominated schools. It can be said, therefore, that this book is much more adapted to the secondary school situation than the guidance practices suggested in such books as *Emotion and Conduct in Adolescence* and *Reorganizing Secondary Education* issued by the Committee on the Secondary School Curriculum of the Progressive Education Association. It would follow, also, that it is more adapted to courses in guidance in college. This does not imply that *Principles and Techniques of Guidance* is the only text written from the standpoint of the present situation. Such texts as Hamlin and Erickson's and Hahn and Williamson's are written from the same point of view.

Basic principles of guidance are discussed in Part I. Part II takes up the role of the teacher, specialist and administrator in the guidance program, while Part III is concerned with the relation of guidance to the curriculum and the school's program. Illustrations of various guidance programs are given. Part IV discusses procedures. Among those dealt with earnestly are (*a*) the sources of information about students, (*b*) the place and value of records, (*c*) group guidance, (*d*) individual counseling, (*e*) the clinical approach to student problems, and (*f*) the placement and follow-up procedures.

There is a chapter on "The Clinical Approach to Student Problems." In defining the clinical approach the authors give chief emphasis to two procedures—one being the use of many different types of evidence in counseling, and the other the use of different specialists to aid the counselor. It seems to this writer that individual counseling must almost inevitably be of the clinical type since it always implies several different types of evidence. The reviewer thinks, therefore, that not only should one chapter of the procedure section have the distinction of having the clinical approach attached to it, but that all sections on individual counseling should be permeated with it. This is not meant merely as a criticism of the organization of this book but is a criticism of most treatises on guidance. Apart from group guidance, good guidance is a clinical affair.

The book is so comprehensive that I have one fear for its use—and this in spite of the warning given by the authors themselves. I am

afraid that students in college, guidance workers and others will think that this book covers everything that is needed for guidance. It could serve well as a basic fundamental text for a core course in guidance. It is complete for the administrative aspects of the program, and is the only work at present that covers that aspect of the field completely. College deans and those in charge of the in-service training in guidance should recognize that specialization in guidance should include more intense training in some of the areas covered in this book, such as occupational information and the analyses of interests and abilities through tests, scales and placement procedures.

The book is well organized. The questions and problems at the end of each chapter are excellent. Special techniques for evaluating guidance programs are given in the appendices.

DAVID SEGEL

U. S. OFFICE OF EDUCATION

TIME AND THE MIND. By Harriet Babcock. Cambridge, Mass.: Sci-Art Publishers, 1941. Pp. 304. $3.25.

Mental tests and intelligence scales have been criticized justly for ambiguity of content, for arbitrariness of units of measurement, and consequently, for ambiguity in interpretation. The expressed dissatisfaction is that a single score obtained from the administration of an intelligence test does not, and cannot, yield a complete appraisal of a client's performance, behavior, past experience, or even of "the ability to learn." The statistical psychologists and the clinical psychologists, each in their own way, have shown that a single score, for example, mental age, or intelligence quotient, or raw score, or transmuted score, is a resultant of the operation of many differential abilities.

Some of the statistically minded psychologists believe "what is measured by an intelligence test is a complex of general and specific factors which may best be expressed alphabetically"; others, perhaps more daring, venture to name the factors assayed in intelligence test performance as functions of verbal ability, numerical ability, spatial ability, verbal fluency, memory, attention, speed, learning ability, and the like. At present, there can be little doubt that intelligence tests, at best, are mixtures of tasks varying in difficulty, in ranges of ability appraised, and in speed required for their completion. Nor can there be any doubt that intelligence tests vary in content (numbers, words, figures, information), in form (completion, true-false, multiple choice, free response), or in required behavior (memory, relational thinking, learning, classification). The heterogeneity of content, form, behavior, speed, and difficulty must introduce factors, real or statistical, which make the single score a relatively confused melange.

The clinical psychologists, too, have expressed dissatisfaction with the single score of the intelligence test. They have shown that scatter or dispersion on a test may be used in the classification of clients. They have also shown that differences between success in specific subtests may be related, qualitatively or quantitatively, to differences in intellectual and personal adjustment. The various clues to a client's functioning performance have been utilized, more or less shrewdly, for a more complete appraisal of a client.

Dr. Babcock, in my opinion, is a clinical psychologist who believes the early successes of the testing movement "blinded psychologists to the possible significance of the *exceptions*" in their imperfect correlations. She maintains that psychologists, overcome with statistics, have substituted numbers for thought, and psychologists because of their inadequate training have utilized data unaware of the reality of the person. Nor is Babcock wrong. There can be no denial of the fact that *some* psychologists have placed a greater emphasis upon numerical results than upon complete appraisal of the person. Dr. Babcock, however, is not completely right. Psychologists, at first, engaged in work of administrative classification; they developed tests—for example, Binet-Simon, Army Alpha—that could be interpreted with ease "with relatively little implication of quantitative or qualitative equivalence" of the subtests from which the score was derived.

Only as study, insight, and research were focused upon the problem of intelligence and its measurement, did the administrative task diminish in favor of the more adequate clinical estimation of human abilities. Dr. Babcock's book represents her approach to adequate clinical appraisal of a client's functioning. The theory, expressed in her book and in the revision of her test, the Babcock-Levy "Examination for Measuring Efficiency of Mental Functioning," is that mental activity is the interaction of sensory discrimination, memory, abstract-verbal ability, and time. Basing her theory on quantitative and qualitative analyses of dements, normals, and some psychoneurotics,

Dr. Babcock repudiates factor analysis as a means for developing an understanding of mental organization. Further, she repudiates the extremely mentally deteriorated as a group in which to study the integration of functioning mentality.

The kernal of the Babcock hypothesis lies in the fact that "normal functioning of increasingly higher intellectual potentialities depends upon an apperceptive background which has been gradually acquired through the interaction of native capacity and experience and can be used with varying degrees of awareness according to the demands of a particular problem as well as according to level of intelligence." Moreover, since Jost's laws have been experimentally confirmed by A. C. Youtz, it may be stated "given two associations of the same strength but of different ages, the older falls off less rapidly in a given length of time" and "given two associations of the same strength but of different ages, the older one has the greater value on a new repetition." This implies, in mental deterioration, "the effects of the oldest learning are the last to be lost."

The hypothesis, then, as advanced by Dr. Babcock, attempts to get estimates of success with older learning, against which to relate estimates of success with newer learning. The estimate of success in older learning would then be an approximation to level of abstract relational thinking, and the estimate of success in newer learning would be an estimate of mental efficiency. If the two estimates of level and of mental efficiency were in agreement, then, there would be no loss of efficiency. If, however, the two were in disagreement, the difference would be diagnostic of mental deterioration. It can be seen that the essentials of the Babcock hypothesis are not novel.

Dr. Babcock's contribution lies in the development of a clinical instrument to appraise mental efficiency. Ever since the Hart and Spearman study of mentally ill patients who were "characterized by a general loss in abilities involved in tests of simple sensory discrimination, motor tasks, and memory," clinical psychologists and psychiatrists have reported that clients diagnosed as mentally deteriorated have been relatively more successful with certain phases of vocabulary knowledge as compared with performances in which abstract thought were required, or in which speed and adaptation were stressed. Dr. Babcock utilizes results from studies such as Hart and Spearman, and Rawlings to define operationally her concept of mental efficiency. She believes that mental speed is symptomatic of efficiency. "When, however, we get into the pathological field, we note that some persons who can abstract and reason at a high level get confused and are slower in simple tests than are some persons of inferior intelligence, and we realize that mental tempo is an aspect of mental organization which must be separately evaluated."

The Babcock-Levy battery of tests represents the operational approach to the Babcock hypothesis. To the original test, there have been added nine new tests, five of which are used as efficiency tests, and the other four to estimate abstract verbal ability. In general, the level of intellectual ability is appraised by the administration of the 1916 Terman vocabulary, mental efficiency is estimated by the median success on groups of tests such as Easy A (naming days, naming months, writing name), vocabulary learning, memory (repetition of sentences, paragraph retention), and the like. Each test is allegedly weighted in terms of developmental level and in terms of controlled level (Terman vocabulary). It seems, although the text is not unambiguous, that developmental level means at least two things,—the score of normal subjects aged 6 to 10 years on the mental efficiency tests yields developmental scores of 6, 7, 8, 9, and 10 according to their median placement by age, and the scores of 11 and beyond are placed according to their median placement by age, and the scores of 11 and beyond are placed according to the median placement of normals having vocabulary (level) scores of 11 and beyond. The units, although specifically rejected, nevertheless, seem to be some kind of mental age score.

Operationally, the test, in its clumsy way, will yield a variety of patterns, and will yield a differential between level and efficiency which may be characterized as an efficiency index. But, such a function could be achieved by better tests better organized. It seems strange that with all the criticism of the mental age unit as applied to adults that Dr. Babcock has clung to it.

Since Balinsky has shown that the factor pattern of the Bellevue-Wechsler at different ages lacks consistency, and since Jones and Conrad have shown that different subtests of the Army Alpha make different contributions to the total score at different ages, and since Lorge has shown the differential aspect of

speed of performance in older ages, it seems strange that Dr. Babcock naïvely assumes that normal functioning should be appraised in terms of the performance of a group younger than 25 years. The contributions of speed, and of the various abilities measured will be different, particularly for persons aged 30 to 70.

Certainly, in terms of the explicit statement "The only meaning to be attached to each test is what actually is done and what can be logically inferred from its relations to other results," Dr. Babcock's test must be criticized explicitly for at least two defects. The first is the failure to appreciate the relations of the test results to age, and second, the failure to show the intercorrelations among each of the tests for the normal group at least. While Dr. Babcock looks askance on statistics, she does use them to make her points. She certainly had an obligation to show in how far the tests were measuring *validly* and *reliably* the performances she thinks are diagnostic of mental efficie..cy. The entire mental efficiency battery has an estimated reliability of about .9; the reliability of the level score, however, is not reported. In my opinion, in the range of talent utilized in the Babcock standardization, it would be about .85. It is a fairly well known fact that the reliability of the difference between level and mental efficiency would be conditioned by the reliability of both tests. It will probably be of the order of .8 or even less. It also may be inferred that reliability of each of the subtests is considerably less than .9.

All in all, as a test to estimate mental efficiency, the Babcock-Levy examination will yield an estimate of mental functioning. It does so, however, despite the standardization of the selected tests, and at the expense of forcing a notion of intelligence which by this time might be more critically appraised. Vocabulary is not necessarily a measure of level or of older learning. Yacorzynski has suggested that the vocabulary test is relatively successful not primarily because it measures stable older learning, but because the crudity of its scoring allows no credit for the level of response. Moreover, Christian and Paterson, Weisenberg, Roe, and McBride, Shakow and Goldman, have shown that vocabulary as measured by the Babcock-Levy examination not only does not decrease with advancing age to 40 or 50 and beyond, but that there is a possibility of increment in vocabulary beyond age 50. In so far as vocabulary level is taken as a referent for older people, deterioration may be overestimated. Rabin, in addition, has shown that the patterns of test success differ in senility markedly from those in schizophrenia.

Dr. Babcock's notion that level of mental ability can be appraised by vocabulary, and that level of mental efficiency can be appraised by a battery of short, acceptable tests does not materially advance knowledge of intelligence or of its measurement. It, as a notion, suffers from the single score approach, particularly in assaying intellectual level, but just as specifically in estimating intellectual efficiency independent of age changes. In assaying intellectual or behavior deviates, the pattern approach might well be utilized, but it must be remembered that patterns need to be developed from very reliable tests, correlating rather low among each other.

The task of reviewing Dr. Babcock's contributions has been made somewhat more burdensome by the lack of editorial supervision given her text. Terms, concepts, and definitions, tend to get mixed up; table headings are ambiguous, and some of the tables of data do not check out. Dr. Babcock's contribution to psychology may be appraised incorrectly because of a lack of clarity in its presentation.

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DEVELOPMENTAL DIAGNOSIS. By Arnold Gesell and Catherine S. Amatruda. New York: Paul B. Hoeber, Inc., 1941. Pp. xiii + 447. $6.50.

Arriving almost yearly now are the brain children of Dr. Gessell *et alii*. The latest brain child, although showing a very strong resemblance to Gesell's other volumes—it contains the usual description of the one-way screen, "clinical" crib and chair, cinematographic techniques, the Gesell examination materials and behavior norms—may lay some claim to individuality in that it is an offering to the physician. The material descriptive of developmental sequences and behavior standards, which we have come to associate with Gesell and his coworkers and which has been presented in painful detail in such earlier volumes as *Infant Behavior*, has been codified and rearranged in this latest work from the Yale laboratories. Since no new basic data are being presented, those crudities of standardization and quantification which obtained in the case of the findings reported previously, still obtain. Simplifi-

cation of presentation is achieved by the use of charts, phototracings, and by tabular arrangements which make it easy to get both horizontal and vertical views of the behavior complex Gesell is trying to analyze. The behavior picture, furthermore, is sketched in detail only for what have been called key ages—4, 16, 28, and 40 weeks and 12, 18, 24, and 36 months.

The physician is encouraged to compute a Developmental Quotient for his child patient, or even several quotients. In the derivation of these he is allowed much liberty. Unfortunately, Gesell gives no hint of the effect upon the magnitude of the D.Q. of such factors as test composition, statistical artifacts, or standardization procedures. One is told that "in uncomplicated cases we assume the rate will remain more or less constant throughout the whole cycle of behavior growth." (P. 114.) The California, Fels Foundation and Harvard results, for example, whether because of the nature of mental growth or the instruments used to reveal it, would scarcely support this statement unless the terms "uncomplicated" and "more or less" are stretched seriously. Since the average physician has no training in psychometrics, statistics, child psychology, or allied disciplines and since, furthermore, his judgments are likely to reflect themselves promptly in recommendations for the treatment of his patient, the writer wonders if both the physician and his patient might not fare better if the former employed some one adequately trained to make and evaluate the behavior determinations just as in the case of blood chemistry analyses, etc.

In addition to providing descriptions of examination methods and behavior norms, the Gesell text devotes considerable space to the discussion of behavioral and developmental correlates of certain types of neurological defect as well as to certain problems of child adoption and child guidance. In spots the content of the volume resembles that of a text on differential diagnosis, though the treatment of particular disorders and symptoms is scarcely sufficiently thorough and detailed to justify this classification. The volume apparently aims rather to inform the physician of how children with various defects—birth injuries, lesions of specific areas of the nervous system, sensory handicaps, convulsive disorders, endocrine anamolies and amentia—may be expected to perform when faced with the tasks around which Gesell's normative schedules have been built. Consistent with this objective, the authors seldom mention any contributions of other workers to the problems considered or provide any substantial evaluation of controversial theories as to the causation of any of the disorders discussed.

Since the writer is limited to a very brief review, she will simply list a few out of a considerably larger number of statements which she believes are due some challenging.

1. "*Formed* connections have been made between nerve fibers and muscle fibers. A behavior pattern has taken place. All behavior patterns both in prenatal and postnatal life take shape in a comparable manner." (P. 4.) (Is not this at best, even if the particular wording is ignored, an oversimplification not necessary in a medical text?)

2. "The D.Q., unlike the I.Q., is not limited to a single inclusive formula. A distinctive D.Q. can be derived for each of the four major fields of behavior; for specific functions like prehension, locomotion, manipulation, etc. This makes the D.Q. an adaptable device. The I.Q. registers changes in the growing complex of behavior. Fluctuations in a general D.Q. or in specific D.Q.'s denote intrinsic and extraneous factors which are subject to interpretation." (P. 115.)

3. "In some of its manifestations precocity may be regarded as a form of *environmental acceleration*. It may reflect a disproportionate emphasis on verbal behavior; but such an overstimulation can scarcely produce primary acceleration. It is more in the nature of excessive specification and overorganization." (P. 272.) (Since "primary" in the text is used to mean genetic, Line 4, in effect, offers proof by definition.)

4. "Well-defined speech prior to the first birthday, however dependent on models for imitation, can scarcely be ascribed to environmental forcing. It represents an inherent growth characteristic, biologically determined." (P. 273.) (Evidence? Of course, for anything the organism does it must have the necessary structure, but this consideration does not illuminate the problem of individual differences which is implied.)

The format of the volume is good. Type and margins are large; punctuating devices numerous.

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**THE CLINICAL APPLICATION OF THE RORSCHACH TEST.** By Ruth Bochner and Florence Halpern. New York: Grune & Stratton, 1942. Pp. 216.

**THE RORSCHACH TECHNIQUE.** By Bruno Klopfer and Douglas M. Kelley. Yonkers-on-Hudson, N. Y.: World Book Co., 1942. Pp. 436.

In the twenty-one years that have elapsed since the publication of Rorschach's *Psychodiagnostik*[1] in German, hundreds of articles on the Rorschach method have appeared in English, but only one book, Beck's *Introduction to the Rorschach Method*[2] was published before the early part of 1942. In the latter year, however, two books dealing with the Rorschach saw the light of day several weeks apart.

These two books constitute a study in contrast. Bochner and Halpern's *The Clinical Application of the Rorschach Test* is a carelessly written work, replete with loose statements, contradictions, and misleading conclusions. Its generalizations are oversimplified to such an extent that a beginner in the Rorschach method, attempting to apply them, would become hopelessly confused. One can picture the confusion of the Rorschach learner who reads in the same paragraph (pp. 55-6) that "Ambiequal individuals are relatively rare," and then, "Thus we see why many neurotics fall in the ambiequal group." Then, to cite one more of many possible examples, let us follow that beginner to page 139, where he learns that, in the case of the compulsion neurotic, "The Rorschach protocol will show marked coartation," but, when the reader examines the three cases illustrating compulsion neurosis (cases 11, 12, 13), all of them are markedly expanded. Some of the other illustrative cases likewise contradict the text, or are atypical.

In the preface, the authors indicate that they have "organized and reworked" much of the Rorschach literature and have "given in brief and simplified form an exposition of the Rorschach Test." In reading the book, one is impressed by the small number of sources actually employed, and by the extent to which the authors leaned upon Klopfer, sometimes giving credit, and frequently not.

The book was obviously compiled in great haste. The reviewer does not remember another book in which so many grammatical errors occur. The English is frequently so poor that it would not be acceptable in a freshman composition.

The naïvete of the presentation is shown by some of the chapter headings. Chapter III is headed, "What the Symbols in Column I Mean," and Chapter IV, "What the Symbols in Column II Mean." On the other hand, the last chapter (XV) has a rather ambitious title: "Recent Developments of the Rorschach Test." This chapter consists of little more than three pages. No more apt commentary, both on this chapter and on the entire book, can be made than that of the authors in the first sentence of the closing paragraph of the chapter and book: "This chapter in no way covered all the recent avenues of research, either as they relate to better understanding of the instrument or as they pertain to personality problems."

Klopfer and Kelley's *The Rorschach Technique* is quite another matter. It is a careful, scholarly presentation of a very difficult subject, and is extremely well written. The authors have presented a systematic, comprehensive exposition of the method and have added their own original contributions to the procedures. They have refined and elaborated many of the Rorschach concepts. Some Rorschach workers, including the reviewer, do not agree with all of these refinements and elaborations. However, the authors usually present opposing views, and are free to admit when their changes in scoring technique or interpretation are inconclusive or tentative. They have departed radically, for example, from Rorschach's original concept of "good form," or $F+$, and have eliminated entirely the $F+$ per cent. The latter is so generally used that Klopfer and Kelley were forced, in discussing the Rorschach in connection with pathological conditions, to re-introduce this concept.

The experienced Rorschach worker will find some of Klopfer's scoring refinements elaborated out of proportion to their importance. The beginner will probably find the very simple explanation of scoring symbols, included in the Record Blank attached to the end of the book, a more useful and concise treatment of scoring categories than the three chapters on that subject. Chapters V, VI, and VII could have been much clearer if some of the more technical and rarer aspects of scoring had been

[1] H. Rorschach, *Psychodiagnostik.* (Third ed., edited by W. Morgenthaler.) Bern: Huber, 1937. Pp. 255.

[2] S. J. Beck, *Introduction to the Rorschach Method: A Manual of Personality Study.* American Orthopsychiatric Association Monograph, 1937, No. 1. Pp. xv + 278.

removed and placed in the appendix.

The examination and scoring procedures also seem unnecessarily complicated, and very few experienced Rorschach workers would employ the full process as outlined in the book. The steps involved in performance, inquiry, testing the limits, location chart, scoring list, tabulation sheet, determinant graph, table of relationships among factors, and interpretation, have value for students. Most Rorschach workers adhere to the much simpler process of Rorschach's *Psychodiagnostik*, which places the responses, inquiry, and scoring adjacent to each other, followed by one summary tabulation of scoring factors. This simpler type of recording presents a single *gestalt* of the performance rather than a bewildering array of tabulations.

Only one case is presented in the entire book. The reviewer feels that poor judgment was shown in selecting this case. It is atypical in many ways. Numerous pathological factors, admirably discussed elsewhere in the book, make their appearance in the sample case, but their significance is not pointed out.

With the exception of the case, and some minor items, the treatment of the Rorschach method in this book is excellent. To say that it is the most complete manual on that method available in the English language would be saying very little indeed, since there are so few. It is difficult to see how a clearer manual can be compiled for years to come. One of the major merits of the book is the fact that the authors have not attempted to condense the complex, dynamic method into over-simplified, stagnant, magic formulae, so that he who runs may make snap judgments on personality. They present the substance of the method so that serious students of clinical psychology or psychiatry who are willing to put forth the necessary effort may learn to apply the method.

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# FORUM

## INDUSTRIAL INVESTIGATIONS IN ENGLAND

The annual report of the National Institute of Industrial Psychology in London shows that fifteen investigations were carried out by the Institute staff in 1941. The work completed has shown the practical application of the knowledge and experience built up in this field over the past two decades. The Institute report reads in part as follows:

> Industry is faced under war conditions with problems familiar in peace time—firms have always had to recruit, select, train, consider methods of work, working conditions such as lighting, heating and ventilation, hours, incentives, methods of wage payment, absenteeism, employee representation and innumerable other questions in the day-to-day industrial environment. But these familiar problems have been intensified by the urgency of war production, the shortage of skilled labour, the effects of air raids, black-out, transport difficulties and a general restlessness due to a variety of causes.

The report also states that the investigations have dealt with these problems in new forms. In solving the question of recruitment, it has been found possible to organize shifts of half-time workers with very good results. For some firms assistance has been given in selection and allocation of staff by means of tests and improved interview procedure. During 1941 the Institute has also helped in the detailed training of new workers and it is reported as follows:

> In this work it is important (1) to insist on the choice of a suitable instructor, (2) to analyze the 'information' about the job so that it can be presented clearly and effectively and (3) to study the movements required so that good methods can be taught from the start. The Institute has helped in the organization of training departments and has advised on methods of assisting new workers to settle down and in reducing labour turnover in the early stages. Two very successful training courses for industrial trainers were held at the Institute's headquarters during the year.
>
> In the closely related field of methods of work, and the layout and equipment of the work place, it has been possible to introduce improvements. Few people realize, for instance, that an alteration of a few inches in the height of a foot-pedal may save an operative some 1,200 yards of unnecessary movement in a day. In considering methods of work, the Institute has not confined its attention solely to productive work; it has also considered methods of inspection. Surprisingly wide differences are frequently found between the standards of different inspectors and the judgments of the same inspectors on different occasions. For this reason training in inspection is just as important as in directly productive operations, for often inspectors fail to realize standards to be maintained and tolerances allowed.

Under present conditions many English firms have found absenteeism and unpunctuality serious handicaps to production. In dealing with the former, the Institute has found it valuable to make arrangements for all absentees to be interviewed on their return to work, for operatives need to know that their absence and unpunctuality are felt and regarded seriously. By occasional "punctuality drives" the Institute found it possible to reduce lateness to less than a quarter of what it was.

FORREST H. KIRKPATRICK
RCA MANUFACTURING COMPANY
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